THE PERCEIVED BENEFITS OF CLOUD COMPUTING TECHNOLOGY FOR REGIONAL MUNICIPAL GOVERNMENTS AND BARRIERS TO ADOPTION

A Thesis submitted by

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Abstract

Cloud computing is becoming increasingly important in Information Technology (IT) as an enabler for improved productivity, efficiency and cost reduction. It is expected to offer benefits for public sector organisations and government agencies. Cloud computing has the potential to improve the reliability and scalability of IT systems, which in turn allows organisations such as regional municipal governments to focus on their core business and strategy development and implementation. Research about the use of cloud computing in the public sector in general is limited. There is a lack of exploratory studies that provide an in-depth and holistic investigation of the factors that influence the adoption of cloud computing. To date there is a lack of empirical studies about the factors that influence the adoption of cloud computing in Australia.

This research explores the potential for value creation that can be derived from cloud computing through its use by Australian regional municipal governments; to identify factors that are likely to influence its adoption including factors that need to be considered when planning to adopt cloud computing, current policy settings for cloud computing adoption, the anticipated benefits of cloud computing adoption, and the challenges and issues that the adoption of cloud creates. The research model was based on a combination of two theories derived from the literature: the Technology-Organisation-Environment (TOE) framework and the Diffusion of Innovation (DOI) theory.

This research aims to improve understanding of the factors that influence cloud computing adoption decision making by regional municipal governments. This research has employed a mixed method approach (qualitative and quantitative). In-depth interviews with Australian local government councils' IT managers were conducted with the aim of providing insights into the factors that were perceived to be those likely to influence their adoption of cloud computing; including factors that need to be considered when planning to adopt cloud computing, current policy settings that affect cloud computing adoption, the anticipated benefits of cloud computing adoption, and the challenges and issues that are faced by those seeking to adopt cloud computing. Survey data from 480 IT staff across 47 local government councils were collected to confirm the findings of the exploratory stage.

The factors that were examined included: compatibility, complexity, cost, security concern, organisation size, and anticipated benefit which were found to have a positive and significant influence on intention to adopt cloud computing in Australian regional municipal governments. The findings of this research can be used to assist decision-making about investment in adopting cloud computing.

Certification of Thesis

This thesis is entirely the work of ***Omar Massoud Salim Hassan Ali*** except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Student and supervisors signatures of endorsement are held at USQ.

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Ali, O., Soar, J., McClymont, H., Yong, J. and Biswas, J. 2015, 'Anticipated benefits of cloud computing adoption in Australian regional municipal governments: an exploratory study', *Proceeding of the 19th Pacific Asia Conference on Information Systems*, Singapore, pp. 1-17.

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- **Journal Papers:**

Ali, O., Soar, J. and Yong, J. 2016, 'An investigation of the challenges and issues influencing the adoption of cloud computing in Australian regional municipal governments', *Journal of Information Security and Applications*, vol. 27/28, pp. 19-34.

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- **Chapters:**

Ali, O. and Soar, J. 2016, ‘Technology innovation adoption theories’, in L Al-Hakim, X Wu, A Koronios & Y Shou, *Handbook of research for competitive advantage through sustainable, lean and disruptive innovation*, IGI Global, Australia, pp. 1-38.

- **Reports:**

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- **Papers under Review:**

Ali, O., Soar, J. and Yong, J. 2016, ‘Factors to be considered for cloud computing adoption’, *Journal of Web Intelligent*. ***Under Publication Process***.

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Ali, O., Soar, J. and Yong, J. 2016, ‘Cost impact of the adoption of cloud computing: an analysis of the Australian regional municipal government sector’, *The Journal of High Technology Management Research*, ***First Round Review***

Ali, O., Soar, J. and Yong, J. 2017, ‘Challenges and issues that are perceived to influence cloud computing adoption in local government’, *the 21st IEEE International Conference on Computer Supported Cooperative Work in Design*, ***Under Review***.

Abbreviations

IT	Information Technology
CC	Cloud Computing
ICT	Information and Communication Technology
ARMGs	Australian Regional Municipal Governments
IS	Information System
GEAR	Government E-payment Adoption Ranking
SaaS	Software as a Service
PaaS	Platform as a Service
IaaS	Infrastructure as a Service
ENISA	The European Network and Information Security Agency
APIs	Application Programming Interfaces
CSA	Cloud Security Alliance
EC2	Elastic Cloud Computing
NIST	National Institute of Standards and Technology
SLAs	Service-Level Agreements
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
DOI	Diffusion on Innovation
TOE	Technology-Organization-Environment Framework
ANISA	Australian Network and Information Security Agency
ILM	Internet-based Learning Medium
PLS	Partial Least Squares
SEM	Structural Equation Modelling
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
MRP	Material Requirements Planning
CSED	Corporate Social and Environmental Disclosure
VLC	Virtual Computing Lab
C3	Community Cloud Computing
G-Cloud	Government Cloud
MCA	Manual Content Analysis
FA	Factor Analysis
CFA	Confirmatory Factor Analysis
URS	Urban Regional Small
URM	Urban Regional Medium
UFM	Urban Fringe Medium
RAL	Rural Agriculture Large
URL	Urban Regional Large
RAV	Rural Agriculture Very Large

RTL	Rural Remote Large
RTX	Rural Remote Extra Small
RTS	Rural Remote Small
RTM	Rural Remote Medium
URM	Urban Regional Medium
UFV	Urban Fringe Very Large
UDM	Urban Development Very Large
LGC	Local Government Council
MCA	Multiple Correspondence Analysis
SBMI	Sustainable Business Management and Improvement
SOAP	Simple Object Access Protocol
CA	Cluster Analysis
PIS	Payroll Information System
RFID	Radio Frequency Identification Technology
LGAQ	Local Government Association of Queensland
USQ	University of Southern Queensland
HREC	Human Research Ethics Committees
CSPs	Cloud Service Providers
EFA	Exploratory Factor Analysis
Compat	Compatibility
Complex	Complexity
SecC	Security concern
TMS	Top Management Support
OZ	Organisation Size
EK	Employees' Knowledge
GR	Government Regulation
II	Information Intensity
AB	Anticipated Benefits
CMIN	Normed Chi Square
RMR	Root Mean Square Residual
GFI	Goodness-of-Fit
AGFI	Adjusted Goodness-of-Fit
RMSEA	Root Mean Square Error of Approximation
IFI	Incremental Index of Fit
TLI	Tucker-Lewis Index
CFI	Comparative Fit Index
SMC	Squared Multiple Correlation
SRW	Standardised Regression Weights
CR	Critical Ratios

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1 CHAPTER ONE:-

INTRODUCTION

1.1 Overview

This chapter presents a brief overview on the research topic. It provides a background to the research problem and identifies the research questions. It also presents the research objectives and the main research contributions. It concludes with thesis outline which provides a brief description of the content of each chapter in the thesis.

1.2 Research Background

Information Technology (IT) is considered to be one of the important means by which nations can enhance their development and attain better living standards (Oh & Pinsonneault, 2007). IT does not just have socio-economic implications (Cohen 2004), it also services a variety of human needs (Roche & Blaine, 1996). IT provides methods by which nations can advance and succeed in the global financial, political, and social fields (Cohen, 2004; Roche & Blaine, 1996). IT can be used for developing organisational services in terms of profitability and effectiveness as well as in improving asset utilisation (Baark & Heeks, 1999).

Recent developments and introduction of IT concepts such as cloud computing (CC) have gained significant attention from government agencies, business organisations and other various institutions (Buyya et al., 2009), as they are perceived to be highly effective in reducing the expenses of services by employing the standard of user-pays (NIST, 2009). According to NIST (2009) and Gatewood (2009), services depending on CC have accessibility from anywhere and at any time, which sets it apart due to this key difference it has that is clearly an advantage over PC-installed software. CC has the capacity to expand in order to match the inevitable growth of tasks by the user as well as provisioning resources based on requirements (NIST, 2009).

CC is one of the innovations that has attracted attention in the Information and Communication Technology (ICT) sector (AGIMO, 2011; Ryan & Loeffler, 2010). CC has gained a rapid attention due to its ability to provide IT services via Internet (Ryan & Loeffler, 2010). Due to this, it has been increasingly introduced by government organisations (AGIMO, 2011). Barwick (2013) claims that the recent global economic downturn has played a major role in the increasing the use of CC as a solution for reducing service costs.

Some researchers have emphasised importance of encouragement and providing more information as strategies to better promote CC's capacity to deliver the aforementioned benefits (Cellary & Strykowski, 2009). CC can be used as a reliable resource for establishing e-government for providing an increased number of services to the public. Further to this, CC has the capacity to use data centre resources with a significantly reduction in the amount of energy consumed. Hence, CC can be considered as a certain type of green technology; as its potential to use shared storage units and servers minimises energy consumption (Marston, 2011; Sultan, 2010).

CC integrates existing technologies for creating a generic user platform for accessing configurable and shared computing resources via the Internet. (Kuyoro et al., 2011; Nicho & Hendy, 2013). The introduction of CC has enabled the reduction of costly IT infrastructure (Nicho & Hendy, 2013; Subashini & Kavitha, 2011), and it allocates the increased usage of mobile technology and broadband Internet services; which in turn improves system accessibility for users (Gupta et al., 2013).

CC has been identified as a resource capable of providing highly accessible processes, communication and storage; plus cloud-based services are readily available for private organisations, government bodies and individuals alike (Paquette et al., 2010). CC provides hardware, software and platform as services (Paquette et al., 2010; Son & Lee, 2011). CC has transformed IT services from an investment-based infrastructure to a service received through the Internet which facilitates customers to benefit from the respective services regardless of time and place. An increased demand for quicker delivery of services is likely to persuade organisations to adopt this technology for improved IT agility (Oliveira & Martins, 2011).

Australia is one of the early adopters of IT, and is ranked 6th in the world for overall government performance in the use of e-services, behind the United States (US), United Kingdom (UK), Norway, Germany, and South Korea (GEAR, 2011).

In comparison to urban areas, Australian rural and regional communities are faced with greater challenges related to service accessibility, employment opportunities and educational opportunities where the use of e-government is continuing to worsen due to the fact that more services are being provided online by business and government (Baxter et al., 2011). In many isolated rural regions, not all services are available or are only available at a comparatively high cost at a lowered level of quality than in the urban regions (Asthana, 2003). The growing demand for support services is only compounding the existing issue of access to services in rural communities. So, using new technology such as CC could help in improving the services that are required by individuals, families, communities, and service providers (Baxter et al., 2011), which can support them in accessing services in a timely and cost effective way. CC has the potential for developing and maintaining better communication channels among communities as well as increasing the service performance of the respective communities (AIIA, 2013: Organisation for Economic Co-operation and Development, 2010).

1.3 Statement of the Problem

The adoption of CC is increasing worldwide, given the opportunities and benefits to organisations to improve their performance. Research about the use of CC in the public sector in general is limited (Janssen & John, 2011) although there is some evidence of the benefits of CC (Buyya et al., 2009; Marston et al., 2011; Tripathi & Parihar, 2011; Zhang et al., 2010). There are some previous researches that concentrated on the challenges and the issues of CC (Julisch & Hall, 2010; Jensen et al., 2009; Pearson, 2009; Wyld, 2010). There is a lack of exploratory studies that provide an in-depth and holistic investigation of the factors that impact or influence the adoption of CC (Low et al., 2011; Misra & Mondal, 2011). There is lack of empirical studies about the factors that impact or influence the adoption of CC services in reference to Australian Regional Municipal Governments (ARMGs). This limitation has hindered strategy development to improve the adoption of CC in ARMGs (Department of Innovation Industry Science and Research, 2011). There are calls for research on CC adoption to guide implementation decisions from ARMGs to request further research (Department of Innovation Industry Science and Research, 2011).

The research problem, that this research investigates, can be stated as the identification of factors that has an impact or influence on the adoption of CC in ARMGs.

1.4 Research Objectives

The main goal of this research is to explore and investigate the potential for value creation for ARMGs by identifying factors that are perceived likely to influence the adoption of CC. This research also aims to increase our knowledge and understanding on the factors that need to be considered when planning to adopt cloud. It aims to increase our knowledge and understanding on anticipated benefits of the adoption of CC and of the challenges and issues that are faced in the adoption of CC. The objectives of this research are:

1- To investigate the factors that must be considered when planning to adopt CC in ARMGs.

2- To explore the challenges and issues that influence decisions about the adoption of CC in ARMGs.

3- To study the anticipated benefits of the adoption of CC in ARMGs.

4- To develop a research model that can be used to examine CC adoption at the organisational level in ARMGs.

5- To explore the factors that encourage or discourage the adoption rate of CC in ARMGs by evaluating the research proposed model quantitatively with suitable sample size.

6- To empirically confirm the research model quantitatively and confirm its validity.

1.5 Research Questions

To address the stated research problem, and to achieve the research objective and purpose, the main research question guiding this research was as follows:

What are the key factors that are perceived to influence the adoption of cloud computing in Australian regional municipal governments?

Based on the query statement above, five research sub-questions have been formulated:

RSQ1: *What are the actual factors that need to be considered when adopting CC in ARMGs?*

RSQ2: *What are the current policy settings that affect the potential adoption of CC in ARMGs?*

RSQ3: *What are the actual significant anticipated benefits of adopting CC to ARMGs?*

RSQ4: *What are the most important challenges and issues that influence the adoption of CC in ARMGs?*

RSQ5: *Is the research proposed model efficient, valid and reliable to evaluate CC in ARMGs?*

The significance of this research is its attempt to investigate the potential factors influencing the successful CC adoption.

1.6 Research Contribution

This research will help local councils in regional and rural areas make informed decisions about the selection and the adoption of CC by identifying factors that are perceived to be likely to influence the adoption of CC. This research offers the following contributions:

1- To assist ARMGs in the sustainable delivery of quality services to communities through CC.

2- To meet the needs identified by the ARMGs for more studies on the benefits and challenges faced by government agencies and to enhance the adoption rate of CC in Australia.

3- To assist government officers and/or policy makers in gaining a better understanding of the benefits and challenges of adopting CC.

4- From an academic perspective, the research proposed model will help to guide future research and gives clear guidance to researchers about the significant factors that affect the adoption of CC.

5- To contribute to developing concepts and approaches so as to progress the development of e-government.

6- To make a contribution to the emerging literature through an original investigation, analysis and testing of ideas, as well as formulation of a strategic model, for CC adoption in Australia.

The research aims to make a contribution to all levels of ARMGs to assist in the evaluation and adoption of CC.

1.7 Scope of the Research

This research investigated the potential for value creation from adopting CC in ARMGs. The extant literature on adoption of CC appears to be limited in reference to

ARMGs. That is, although literature addressing this issue exists, there is a great deal of detail about the issues of interest addressed in this research. This research used a mixed methods design: an exploratory qualitative method was used in the initial stages, followed by a quantitative method to investigate the factors that influence the adoption of CC in ARMGs. This research focused on IT staff in Queensland local government councils. The IT staff in this research were divided into two groups. The first group were IT managers. These individuals can include: IT directors; IT managers who are responsible for IT management and planning; and a director of IT services. These individuals were included because of their presumed level of information; knowledge and proficiency in adoption of CC in Queensland local councils. Tapping into the knowledge and experience of these professionals was done in order to develop an understanding of the issue from an IT administrator's perspective. The second group was the IT staff who work in IT departments at Queensland local councils. Those people can include: systems developers, analysts, programmers, operations systems administrators and user support staff, all of whom are directly exposed to IT development and support within Queensland local government councils. Those people were included because of their presumed level of skills, knowledge and experience in a relation to CC adoption in their councils.

1.8 Thesis Outline

This section presents the main chapters of the thesis. Overall, the thesis comprised of seven chapters. The entire contents of each chapter in this thesis are described as follows.

Chapter 1:- Introduction

This chapter presents a brief overview on the research topic. It provides a background to the research problem and identifies the research questions. It also presents the research objectives and the main research contributions. It concludes with thesis outline which provides a brief description of the content on each chapter in the thesis.

Chapter 2:- Literature Review

This chapter provides a literature review about the context of CC and its adoption. This chapter presents the state-of-the-art of research into CC and its characteristics, benefit, and challenges and issues. The review also discusses the technology innovation adoption theories and past studies on the adoption of cloud in the public sector.

Chapter 3:- Research Model Design

This chapter builds on the theoretical foundations to develop the conceptual framework and related hypotheses based on the literature. Also, outlines the research design in terms of the research questions; it highlights the theoretical and empirical studies of the factors that can be included within the conceptual framework and presents the hypotheses for the research.

Chapter 4:- Research Methodology

This chapter outlines the research methodology that was used to gather and analyse data to try to answer the research problem that this thesis addresses. This chapter is broken down into four sections; the first aims to explain the research philosophy. The second discusses the selected research approach. The research design is outlined followed by the final section which provides details about research data collection stages and analysis methods.

Chapter 5:- Qualitative Data Analysis

This chapter presents the data analysis and findings of the exploratory stage of the research. The purpose of this qualitative analysis was to identify the potential factors perceived to influence successful CC adoption. This chapter is divided into four sections. The first section reports on the participants' perspectives. The second section discusses the participating councils and is followed by the findings of the research into critical drivers of CC and the discussion of these drivers. The fourth section presents and discusses the findings from exploratory stage that on research proposed model.

Chapter 6:- Quantitative Data Analysis

This chapter outlines the results of quantitative data analysis. It starts with the results of descriptive analysis on the survey respondents' and firms' demographics, followed by the validation of the research instrument which includes factor analysis (FA) for the data that collected on the research proposed model and a validity and reliability tests. It describes the test of Structural Equation Modelling (SEM), followed by examining of the hypotheses' results. Finally, there is a discussion of the overall findings.

Chapter 7:- Conclusion, Limitation, and Future Research

This chapter presents findings about the research objectives and the research theoretical contributions. It presents a discussion on the practical contributions which include the implications for technology consultants and service providers; managers; and government. It provides a discussion on the limitation and the future research and the research conclusion.

1.9 Summary

This chapter has provided a brief overview on the issue that this research has been designed to investigate. It presented the research background followed by the statement of the problem; the main objectives of the research; followed by the research questions. It presented the research contributions and explained the scope of the research. It concluded with the thesis outline which provided a brief description of the content on each chapter in the thesis. The following chapter aims to review the relevant literature and explore the emerging field and foci on the adoption of CC and to the technology innovation theories.

2 CHAPTER TWO:-

LITERATURE REVIEW

2.1 Overview

The key aim of this chapter is to conduct a comprehensive evaluation of the relevant literature relating to the emerging field of CC, focusing on four key areas of research development in general: (1) technology concept; (2) CC technology and its characteristics; (3) technology innovation adoption theories; (4) past studies on the adoption of CC.

This chapter will summarise the results of past studies and comparative analyses, providing a foundation for developing this specific piece of research and evaluating appropriate research methodologies. Lastly, this chapter provides the background material for the remainder of this thesis.

The first section of the review gives a broad outline of the concept of CC and identifies the technological definitions followed by a brief description of IT. The second section provides the definition of CC, along with a brief history, how it relates to other underlying technologies, service, delivery and deployment models that are offered, the anticipated benefits and challenges related to the adoption of CC, the economic growth of CC technology and a brief discussion of e-government as it relates to CC. The third section introduces the different types of adoption levels in the field of Information Systems (IS) (at both the individual and organisational level) and then introduces the technological adoption theories in a relation to each adoption level and gives examples about the selected theories. The fourth section identifies past studies of cloud adoption in specific relation to the public sector. The literature review chapter concludes with an examination of gaps in current research and finally, the summary of the chapter.

2.2 Technology Concept

Different countries have improved their lifestyles and are experiencing a rapid pace of progress due to technological advancement. Innovation and technology are closely correlated with human requirements (Cohen, 2004). Humans can make remarkable achievements as a result of technology (Cohen, 2004; Tisdell & Maitra, 1988). It is an evolving process through which human learning and socio-economic revolutions are accomplished and it is in human nature to continuously look for new areas to improve and enhance their way of life through scientific expansion (Cohen, 2004; Tisdell & Maitra, 1988). The nations in quest of higher living standards and economic boost look to technological innovations to bring about enhancements to prosperity and security (Cohen, 2004).

2.2.1 Technology Definitions

Technology is a science of logical procedures (Willoughby, 1990). Technology can assist in transforming natural resources into beneficial products for human utilisation (Storper & Walker, 1989). It is the integration of resources, systems, computers, machines, procedures, tools and other gadgets that are utilised by humans for the conversion of raw materials into useful services and goods (Jones, 2004). Technology is considered by this research as the application of systematic skills and knowledge - created, activated and enhanced for practical functions in the specific area according to the interpretations of former of technology (Mlawa, 1999).

2.2.2 Information Technology (IT)

Nations have been transformed by IT, including their communication patterns, cultural aspects and their learning styles (Kahen, 1996). Nations can uplift their economy, contribute towards global trade and investment and academic and community development.

In order to improve productivity in communications infrastructure and in public administration, both developed and developing nations can benefit from advancements in IT. The worldwide exchange of massive amounts of data can be acquired and maintained effectively through IT-based applications. These same applications can also assist humanity in creating and achieving a new universal economic demand (Melody, 1991).

2.3 Cloud Computing Technology

The advent of IT, such as CC, in recent years has attracted interest from different stakeholders, such as business organisations, institutions and government agencies (Buyya et al., 2009). This is fuelled by the potential of CC to reduce the cost of the provision of those services. CC offers a shift from installed software to cloud-based services that can be accessed anywhere and at any time. CC offers scalability and on-demand provisioning of resources (Buyya et al., 2009).

Although the concept of CC is a fairly new term, it has been in existence for a while (Vaquero et al., 2009; Lyer & Henderson, 2010). Its roots are related to other computing paradigms such as grid computing and utility computing and many terms used in CC are taken from the those related fields of computing (Buyya et al., 2009; Geelan, 2009; Vaquero et al., 2009; Wang et al., 2008). According to Cafaro and Alonsio (2011) the roots of CC can be taken back to early 1960s, when the concepts of utility computing and time-sharing were developed (Berman & Hey, 2004). The significant areas of focus in computer science during this age were multiplexed information and computing services, which were projects far ahead of their time and which failed due to a lack of public Internet services, advanced communication technologies as well as a lack of high speed processing and storage capacity. However, in this era, the need for multitasking and time-sharing created the preconditions in which CC could thrive (Wang et al., 2008).

The mainframe era of computing was initiated in the 1970 when companies such as Tymeshare Inc began renting out storage space and processing power through telephone lines (Bhattacharjee, 2009). The beginning of the development of the personal computer took place in the 1980s (Durkee, 2010), while in the 1990s the dot-com bubble and the arrival of grid computing were commencing. Grid computing allowed for the linking and sharing of computing resources, while the dot-com bubble led to the emergence of data centres. However, the technology of data centres was not utilised at 100% capacity, which eventually led to the invention of modern CC (Bhattacharjee, 2009).

The first attempt on CC can be identified as the “Loud Cloud” company that was founded by Marc Andreesen, based on the concept of: “build the web’s next power play: custom-designed, infinitely scalable sites that blast off a virtual assembly line” (Sheff, 2003). Loud Cloud was a managed service that was the forerunner of providing services named as software as a service (SaaS). This service was done by utilising Infrastructure as a Service (IaaS) (Sheff, 2003). In 2000 Microsoft launched web services as a SaaS offering, followed in 2001 by IBM with their Autonomic Computing Manifesto (IBM, 2001; Kephart & Chess, 2003) and with the improvement of Internet innovations and expanding requests of computer applications, CC came as a multi-administration supplier that imparts data, programming and open assets inside the Internet-based setting. In October 2007, CC was initially introduced to the public through participation between two computing organisations, IBM and Google (Lohr, 2007). This new idea carried a range of effects and progressions to various fields significant to IT.

The idea of CC is said to be generally new and a developing ideal model (Bayrak et al., 2011; Buyya et al., 2009; Leimeister et al., 2010). By contrast, CC is not an entirely new idea, noting that it is similar to the 1990s' concepts of network computing and grid computing (Kim et al., 2009; Marston et al., 2011). Later, various analysts (Bayrak et al., 2011) predicted the emergence of CC based on the merging of prior advances, such as virtualisation, cluster computing, grid computing, broadband marketing and large scale data centres concentrated at inexpensive areas. As such, most scientists (Foster et al., 2008; Sotomayor et al., 2009) discussed cloud technology in cooperation with grid technology and virtualisation technology.

CC has been defined from different perspectives since it is still at an exploratory stage (Geelan, 2009). One well-known definition is "*clouds or clusters of distributed computers, provide on-demand resources and services over a network, usually the Internet, with the scale and reliability of a data centre*" (Grossman, 2009, p. 23). The European Network and Information Security Agency (ENISA) has defined CC as "*on-demand service model for IT provision, often based on virtualisation and distributed computing technologies*" (Catteddu & Hogben, 2009, p. 14).

One of the most common academic definitions described CC as "*a type of parallel and distributed system consisting of collection of interconnected and virtualised computers that are dynamically provisioned and present as on or more unified computing resource based on Service-Level Agreements (SLAs) established through negotiation between service provider and customer*" (Buyya et al., 2009, p. 3). Another academic definition defines CC as "*a set of network enabled services, providing scalable, normally personalised, inexpensive computing platforms on demand, which could be accessed in a simple and pervasive way*" (Wang et al., pp. 2008, p. 828). These different definitions depict the varied understandings of what CC is from the perspectives of different stakeholders such as; academics, architects, consumers, developers, engineers and managers (CSA, 2009).

The U.S. National Institute of Standards and Technology (NIST) includes other important aspects of CC in its definition: "*a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of services (example include, networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction*" (NIST, 2009, p. 2). This definition promotes the availability of CC and describes its five essential characteristics, its three delivery models and four deployment models as shown in Figure 2.1.

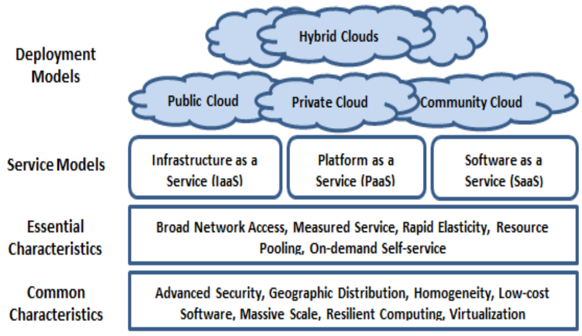


Figure 2.1: The NIST cloud definition framework (NIST 2009)

2.3.1 Cloud Computing Characteristics

The five characteristics of CC according to the definition provided by NIST are as follows: (NIST, 2009).

- ***On-demand self-service.*** A consumer is solely capable of stipulating computing capabilities, for example; network storage and server time, depending on the requirement, without needing the human interaction support of each service's provider.
- ***Broad network access.*** CC services are readily available on the Internet which provides easy access through standard procedures.
- ***Resource pooling.*** For servicing a multitude of customers through a multi-tenant structure. The resources of the service provider are gathered together with diverse physical and virtual resources, dynamically allocated and reallocated depending on the customer demand. Normally the consumer has no command or knowledge over the exact location of the resources provided, therefore there exists a sense of

location independence. However, there are a high level of notion such as country, state or data centre, the consumer may has the ability to specify a location. Examples of resources include storage, memory, processing, virtual machines, and network bandwidth (CSA, 2010; Mell & Grance, 2009).

- ***Rapid elasticity.*** Abilities can be quickly and elastically stipulated, in some scenarios automatically, to rapidly scale in and scale out, as well as released. For the customer, the capabilities which are obtainable for stipulating frequently appear to be unlimited as well as can be bought in at any amount at any time.
- ***Measured service.*** This is one of the vital aspects of CC, where the level of resource and service use is continually tracked, arbitrated and reported for the implementation of the pay-as-you-go model.

2.3.2 Cloud Delivery/Service Models

Cloud services can be categorised on the basis of the following three service/delivery models; Software as a Service (SaaS); Platform as a Service (PaaS); and Infrastructure as a Service (IaaS) (Broberg et al., 2011; CSA, 2009; Mell & Grance, 2009). A representation of the layered structure of the cloud stack from physical infrastructure to applications can be seen in Figure 2.2. These service model levels can be assumed as a layered architecture where services of the top layer can be created from the services of an underlying layer.

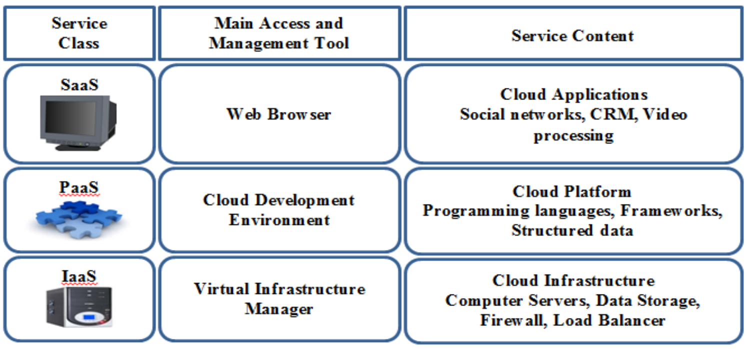


Figure 2.2: Cloud service models
(Broberg et al., 2011)

Based on the resources of virtualised computer, storage and network; the primary layer IaaS is developed. The second layer PaaS, offers cloud development environments which are used to create infrastructure services for providing application development and deployment abilities. At the user application level SaaS is built to provide applications and application programming interfaces (API) (Buyya et al., 2011). Each of these service/delivery models will be explored in the following paragraphs.

- **Software as a Service (SaaS)**

The SaaS service model facilitates the use of service provider's programmes operating on a cloud infrastructure where consumers have the ability of accessing and using applications using a number of client devices by a client interface (e.g.: web browser). The consumers have only a limited number of user-based application settings and they are unable to manage or change the base cloud infrastructure such as operating systems, servers, storage, or network (Buyya et al., 2011; Clemons & Chen, 2011; Marston et al., 2011; Mell & Grance, 2009; Son & Lee, 2011; Velte et al., 2010; Wang et al., 2008). Examples of SaaS include, Salesforce, Netsuite and Google Apps.

- **Platform as a Service (PaaS)**

There are similarities between this CC service model and SaaS model. This model allows the consumers to adopt and develop applications acquired onto the infrastructure of the cloud, with the support of programming languages, as well as the tools provided by the service provider. Similar to the SaaS model, the cloud infrastructure cannot be managed or controlled by the consumers, however the user developed application as well as application hosting environments can be controlled by the consumers (Buyya et al., 2011; CSA, 2010; Dillion et al., 2010; Foster et al., 2008; Mell & Grance, 2009; Velte et al., 2010). Examples of PaaS include, Microsoft Azure Service Platform, Salesforce-Force.com, Google App Engine Amazon Relational Database Services and Rack Space Cloud Sites.

- **Infrastructure as a Service (IaaS)**

This service model supplies processing, networking and other basic computing resources for consumers (Howell-Barber et al., 2013), where they can install and run different software such as operating systems and other programs. Similar to above mentioned service models, the consumers are incapable of managing or controlling the cloud infrastructure but they have the facility of controlling the operating systems, storage as well as other installed applications. Moreover, consumers have a limited control over certain components of the network such as firewalls (Howell-Barder et al., 2013; Buyya et al., 2011; CSA, 2010; Marston et al., 2011; Mell & Grance, 2009;

Yadav & Hua, 2010). Examples of IaaS include, Amazon S3 (Simple Storage Service), Elastic CC (EC2) and Rack-space Cloud Servers.

2.3.3 Cloud Deployment Models

More recently, the cloud community has categorised four cloud deployment models (public, private, hybrid, and community cloud) (Catteddu & Hogben, 2009; CSA, 2009; Dustin-Amrhein et al., 2010; Mell & Grance, 2009).

- **Public cloud deployment model**

This deployment model enables the cloud infrastructure to be available to the general public. Armbrust et al. (2010) states that the infrastructure is owned by an organisation that provides cloud services. Examples of popular cloud services are Amazon EC2, Google App-Engine, and Force.com (Marston et al., 2011). According to Dustin-Amrhein et al. (2010). This model enables clients to set the level of security that they require and negotiate for SLA. For more details see Figure 2.3.

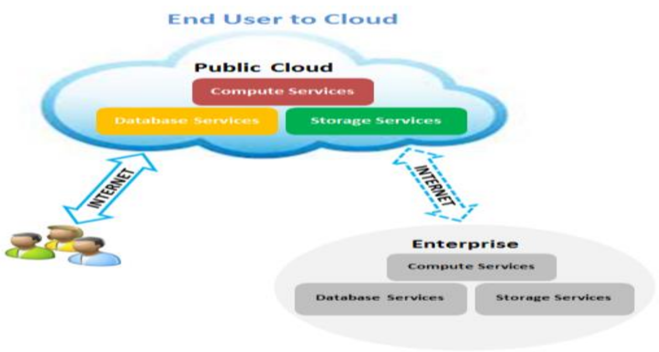


Figure 2.3: Public cloud deployment model (Dustin-Amrhein et al., 2010)

- **Private cloud deployment model**

In this deployment model, the cloud infrastructure is created only to focus on a single organisation. The management and control of the infrastructure can be done by the organisation itself or by a third party, while the infrastructure can be set within the organisation premises or away from the premises (Armbrust & Fox, 2009; Dustin-Amrhein et al., 2010). According to Armbrust & Fox (2009), there are several reasons for setting up a private cloud within an organisation: (1) High security considerations related to data privacy and trust. (2) For optimising the usage and allocation of existing resources internal to the firms. (3) The cost of a private cloud is less than that of data transfer between local IT infrastructure and a public cloud. Further to this, Buyya et al. (2011) and Dustin-Amrhein et al. (2010) pointed out that there is an essential need for organisations to have full control over the critical activities existing behind firewalls. For more details see Figure 2.4.

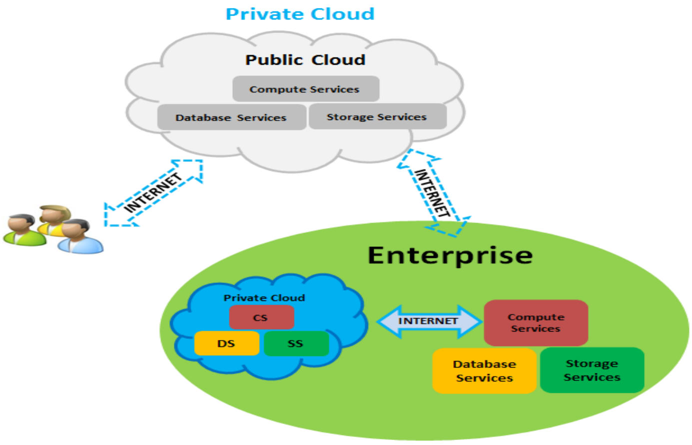


Figure 2.4: Private cloud deployment model (Dustin-Amrhein et al., 2010)

- **Hybrid cloud deployment model**

In this cloud deployment model, two or more clouds (private, community or public) are connected by generic technology enabling portability of applications and data. This cloud deployment model is used by organisations with the aims of resource optimisation, improving core competencies through outsourcing minor business functions onto the cloud and maintaining its core activities within the premises through the private cloud (Marston et al., 2011). According to the Cloud Security Alliance (CSA) (2009), Hybrid cloud is aimed at resolving the issues related to standardisation and cloud interoperability. For more details see Figure 2.5.

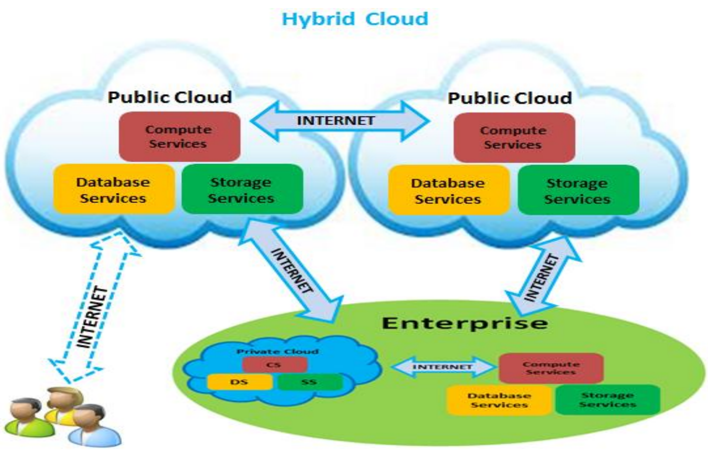


Figure 2.5: Hybrid cloud deployment model (Dustin-Amrhein et al., 2010)

- **Community cloud deployment model**

The community cloud deployment model is designed to support certain types of communities which have similar requirements, for example, security requirements, policies and compliance considerations, such that the infrastructure of the community cloud is distributed parallel across several organisations (Marston et al., 2011). The cloud infrastructure may be established within or outside the organisational premise and managed by the organisation itself or by a third party (Dustin-Amrhein et al., 2010). Up to a certain level, the cloud community behaves with demographical balance and economic scalability (Dustin-Amrhein et al., 2010). Examples for this cloud deployment model are cloud services offered by government organisations such as Passport services, Central Excise, National ID, Railway, Tax as well as Visa and Immigration. In the examples provided, the consumers (in this case the citizens) all have the ability to access the relevant information related to the above mentioned services at various department levels (Local governments, state or centre) using the internet, phone or IVR (Dustin-Amrhein et al., 2010; Marston et al., 2011). For more details see Figure 2.6.

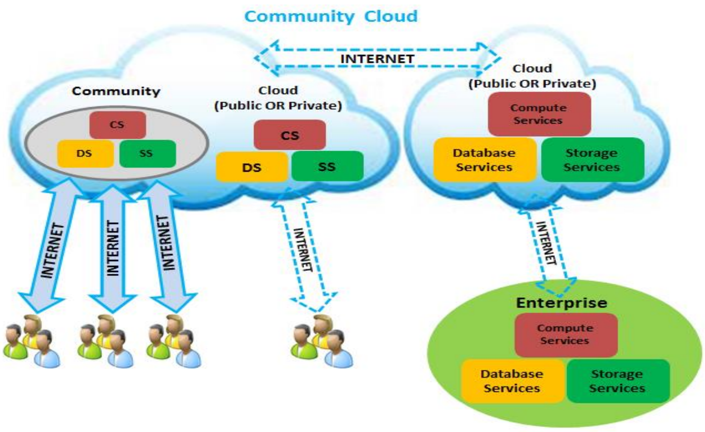


Figure 2.6: Community cloud deployment model
(Dustin-Amrhein et al., 2010)

2.3.4 Anticipated Benefits Related to Cloud Computing

Literature relevant to this study indicates that the potential benefits from the cloud based models are perceived to be the main cause behind the organisations' appetite for adopting CC (LGAQ, 2013). Potential benefits can be outlined as significantly lower initial costs (Saeed et al., 2011; Saini et al., 2011), improved standardisation of services (Beaubouef, 2011), improved scalability as well as accessibility, which has resulted in

CC being implemented across a number of sectors (Saeed et al., 2011; Liang et al., 2011).

Another advantage of CC is that there are minimal requirements for the provision of resources and maintenance after implementation. As a result, the implementing organisation can concentrate more on its core business activities (Liang et al., 2011). Moreover, CC can minimise the costs of infrastructure and platforms, increase network security and service scalability and improve speed of adoption, which are all key benefits in relation to e-government services (Das et al., 2011). Furthermore, CC is viewed as utility computing as its price will be charged dependent upon use (Beaubouef, 2011). Regarding environmental concerns, the CC model is viewed favourably (Cellary & Strykowski, 2009). There are different benefits of CC and each of these benefits will be explored in the following paragraphs.

- **Protection, care and technical support**

The service providers of CC provide access to applications and data services. The uniqueness of CC, pertaining to e-government services, is that the system is efficient enough to solve problems, particularly for government departments outside of urban areas where recruitment of IT staff is more difficult (Cellary & Strykowski, 2009). Cloud service providers (CSPs) are accountable for upgrading software and providing technical assistance (Beaubouef, 2011). Cloud technology makes it easier to upgrade software applications, as they are located in a single system (Cellary & Strykowski, 2009; Marks & Lozano, 2010; Rajkumar et al., 2011; Staten, 2011), further reducing the total cost (Cellary & Strykowski, 2009; Hashemi et al., 2013; Rastogi, 2010; Tripathi & Parihar, 2011).

- **Disaster recovery**

A disaster recovery system is essential. For example, Government organisations can maintain a backup of the server using a CC for disaster recovery on a day-to-day basis and can store it off-site through implementing a third party storage service provider that holds the ability to store data in a different location (Hashemi et al., 2013). Disaster recuperations schemes in clouds is a better choice compared to traditional disaster recuperation programmes as it can restore data in a more prompt and swift manner

(Rajkumar et al., 2011; Singh, 2010); and because this swift recovery reduces the cost of the operation (Staten, 2011).

- **Old technologies and migrating to new technologies**

Some functions of data centres for e-government include the ability to implement diverse versions of the software, programs and security packages (Aveek & Rahman, 2011). However, changing an out-dated technology to a highly sophisticated one has traditionally been a complicated task (Pokharel & Park, 2009). By contrast, CC does not require upgrading from one version to another as multiple versions of the software can be operated simultaneously. This system can therefore offer greater flexibility and efficiency for e-government (Aveek & Rahman, 2011; Cellary & Strykowski, 2009; Pokharel & Park, 2009).

- **Green technology**

The energy consumption of traditional ICT systems is very high and this has a negative impact on the environment by increasing carbon dioxide via its production and operation (Aveek & Rahman, 2011; Tripathi & Parihar, 2011), however, CC is comparatively better in terms of energy consumption (Sasikala, 2012). Through employing virtual services, power consumption of a normal PC can be minimised to 90 percent (Velte et al., 2010). By adopting CC, the cost of data centres related to electricity and cooling reduced to around 53 percent (Zhang et al., 2010). Currently, greater focus has been placed on the impacts of the data centres, including energy consumption and e-waste and other environmental hazards (Aveek & Rahman, 2011). CC is increasingly being considered as a type of green technology, it can potentially improve the utilisation of data centre resources through less energy consumption and the use of large shared servers and storage units. CC can offer energy savings in the provision of computing and storage services (Marston et al., 2011; Sasikala, 2012; Sultan 2010). This could be the ultimate reason for government organisations to switch over to CC. The cloud, rather than developing new facilities, offers the possibility of rationalisation and better use of existing ICT facilities.

- **Policies management**

E-government applications need to be in compliance with governmental policies (Aveek & Rahman, 2011; Pokharel & Park, 2009). In order to increase efficiency in daily performance, these policies need to be implemented in unison with the infrastructure and data centres (Hashemi et al., 2013). Cloud computing architectures can assist with policy compliance within data centres (Clemons & Chen, 2011; Hashemi et al., 2013; Pokharel & Park, 2009; Tripathi & Parihar, 2011). Security-oriented policies can be installed in applications which can be designed and executed inside the data centre (Clemons & Chen, 2011; Tripathi & Parihar, 2011).

- **Promoting business development**

Benefits can be obtained from CC in order to improve business operations by lowering the overall cost of investment in ICT infrastructure (Lenart, 2011; Pokharel & Park, 2009; Salleh et al., 2012). According to Bakshi & Hemachandran (2011), in CC users can obtain software applications, conduct computations as well as offer data storage and access to end users, regardless of the physical location and design of the system which provides the service. Other benefits of CC include; business scalability and integration, improved infrastructure security, availability of acquiescent processes and facilities as well as improved speed of applications and systems and ultimately simplified costs and consumption (Bakshi & Hemachandran, 2011).

- **Improving service delivery**

Traditional government services can involve time-consuming processes that can lack transparency and result in dissatisfied users and businesses. By adopting CC, government organisations can provide improved and more transparent services online. As a result, government organisations can improve the quality of their service delivery to ensure it is timelier, richer in content and with greater availability (Goel et al., 2012; Hashemi et al., 2013; Rastogi, 2010).

- **Reduced IT infrastructure cost**

Due to the aspect of the usage dependent pricing model, significant cost savings can be made through CC and this is considered to be one of its major benefits (Lenart, 2011; Miller, 2008; Salleh et al., 2012). Grossman and Gu (2009), pointed out that start-up organisations can save on capital costs and issues related to entry via the use of cloud-based services. Also, start-up businesses develop the ability to enter the market much more quickly by swiftly implementing new services with minimal to no initial capital investment required, by making use of shared computing resources

(Lanman et al., 2011; Marston et al., 2011). West (2011) also indicated that using cloud-based software can significantly reduce costs relating to updating and maintenance of IT systems, as operations and tasks are taken care of by a third party.

- **Ease of use and flexibility**

Windows-based or web browser-based applications are used as interfaces for cloud-based applications, as they have the characteristics of user friendliness and intuitiveness (Greer, 2009). The majority of suppliers of CC come up with contract terms with increased flexibility, which in turn supports the expansion of the business of customer organisations (Leavitt, 2009). Further to the above aspects, CC offers improved portability and accessibility, as the Internet is used as the backbone for providing services to the customers and through it they can access any application regardless of time or location using an active Internet connection (Lanman et al., 2011). This is a key advantage which supports firms running small scale businesses. Having a broad market and horizontal operations can ultimately lead to the reduction of external costs and reduce the organisation's dependency on its physical location.

The essential qualities of CC include reducing hardware and license expenses, lower up-front expenses, greater simplicity of implementation, re-prioritising and deployment of internal assets elsewhere in the organisation, as well as a minimal requirement for IT assets, with the added benefits of scalability and manageability (Lenart, 2011; LGAQ, 2013). CC does not remove the necessity for IT branch staff, on the grounds that clients are still obliged to access Internet and other computer applications for configuration. CC permits IT administrators to focus on core business functions. As with any ICT operation, potential CC adopters must be vigilant in testing their IT foundation and operations.

In light of the above, this section of the research discussion aims to investigate the anticipated benefits of the adoption of CC in ARMGs. There appears to be a dearth of empirical studies that have been conducted to assess the anticipated benefits within the ARMGs. There are many benefits in the adopting of such new technologies like CC technology that are deserving of greater emphasis. ARMGs encourage more research to investigate the anticipated benefits that are related to the adoption of CC (Department on Innovation Industry Science and Research, 2011). The main reason for the ARMGs to encourage increased research is to enhance the adoption rate of CC in Australian local councils, due to its perceived benefits.

Although most of the published works are based on the academic experiences and studies, this research aims to capture the industrial experience of people in IT within Queensland local councils. These industrial experts include: IT directors, IT practitioners (referred to as IT executives), IT managers who are responsible for IT management and planning; and Director of IT services. These industrial experts will be included within this research due to their level of knowledge and proficiency within the realm of CC adoption within Queensland local councils. Including these industrial experts may help to discover many new benefits that will highly contribute to this research and at the same time, may open new research areas for the future candidates.

2.3.5 Challenges and Issues Related to Cloud Computing

Despite of a comprehensive array of benefits provided by CC systems, there are still several challenges and issues that evolve while employing this advanced computing system within the public sector (Ali & Soar, 2014). The main challenging factor is the security and privacy issues that occur when processing or relocating potential databases into the cloud (Paquette et al., 2010; Subashini & Kavitha, 2011). An efficient e-government system should endeavor to be a highly responsive, economical and user-friendly (Vats et al., 2012). There is interest in CC to improve services, particularly for people who live in remote regions (Vats et al., 2012). Cloud computing also has scope for augmenting the association between different organisations within government organisations. It enables reduced repetition and unnecessary duplication of data. Allocating the computational resources between the State Government and other central governing authorities would pave way towards minimising infrastructural expenditure. The transparency provided by CC within government organisations can improve levels of faith and trust within governmental decisions by the general public. CC offers several potential benefits (Vats et al., 2012), however there are also challenges and issues within e-government that are discussed and broadly classified these issues three categories: social, economic and political issues (Tripathi & Parihar, 2011).

There are many challenges and issues related to CC adoption, and each of these challenges and issues will be explored in the following paragraphs.

- **Security and privacy**

Safety and security issues are a central concern for private institutions, such banks, medical research centers and more recently, public institutions (Behl, 2011; Ramgovind et al., 2010; Pearson, 2009; Julisch & Hall, 2010; Jensen et al., 2009; Wyld, 2010). Security and privacy issues relate to administrative and technical concerns in order to ensure that all cloud-based services have the appropriate amount of protection and confidentiality of both data and information (Paquette et al., 2010; Subashini & Kavitha, 2011). Issues of security are three fold: software security (verification and management of identity and access control), platform security (security relevant to framework, elements and interface) and infrastructure security (security related to the online habitat and any combined storage) (Pearson, 2009; Krumm, 2008; Pearson & Benameur, 2010). There are concerns relating to security including verification (Verma & Kaushal, 2011) and encryption (Hay et al., 2011). Privacy issues in CC relate to data privacy protection in situations of data transfer, usage, apportionment, archiving and elimination (Pearson, 2009; Krumm, 2008; Pearson & Benameur, 2010; Chen & Zhao, 2012; Mahmood, 2011). Furthermore, security and privacy concerns have been noted as barriers to CC implementation as few rules and regulations exist for its implementation (Wang & Mu, 2011). Only SLA have been deemed necessary between CSPs and their end users to ensure privacy and security (Kertesz et al, 2014; Ramgovind et al., 2010;Verma & Kaushal, 2011; Weinhardt et al., 2009).

As CC becomes prevalent in more industries, new security and privacy concerns may arise and potential solutions are suggested (Tan & Ai, 2011; Lagesse, 2011; Poolsappasit et al., 2011; Atanassov et al., 2012). Concerns about security and privacy can arise when CC is integrated with universal systems (Lagesse, 2011), specifically sensor networks (Poolsappasit et al., 2011) and grid computing (Atanassov et al., 2012) have been identified. In order for the cloud to be used for larger systems such as cloud networks (Schoo et al., 2011), the necessity for an efficient and fool-proof protection solution is paramount to conquer any security-related concerns which have previously been emphasised. According to Kaufman (2009), the service provider should apply encryption schema, rigid access control, and continuous and periodic data backups, in order to prevent unverified access as well as ensuring data integrity, concealment and availability.

- **Trust**

Trust is an essential factor in encouraging the acceptance of and dependence on cloud-based services (Mathur & Nishchal, 2010; Karaoglanoglou & Karatza, 2011). Distrust between client and service providers (Abbadi, 2011; Gansen et al., 2010) has been known to arise during the deployment of cloud-based services (Tian et al., 2010). Clients are concerned that their data will be lost in the event that the cloud storage provider either goes bankrupt or is bought out (Yang & Chen, 2010). These types of concerns have shown that trust issues have prevented efficient solutions being provided for cyber-attacks in the cloud, even though control is provided over essential tasks (Dillon et al., 2010). Some researchers indicate that, there was a lack of trust between the CSPs and the client (Khorshed et al., 2011). Others believe that a trusted cloud can be achieved only through a properly protected system and environment (Zou & Zhang, 2011). Shen et al. (2010) speculated that a trustable cloud, along with security components included availability, incorruptibility, protection and dependability.

- **Data management**

The demand for CC is increasing due to its efficiency and effectiveness and its ability to run data-intensive applications on a wide forum (Agrawal et al., 2010). However, this capability is accompanied by data management concerns. Data management concerns relate to data storage (Jaeger et al., 2008) from a single storage provider to data federation (various providers giving storage) (Forell et al., 2011); data segmentation and recovery (Mathur & Nishchal, 2010); data resiliency (Jadeja & Modi, 2012); data fragmentation and duplication (Goyal, 2010) and data backup (Hemant et al. 2011). Other issues include data processing and provenance and data anonymisation (Qureshi et al., 2011).

- **Cost**

The next category of challenges and issues are related to costs, which is directly related to administrative tasks and hardware. The costs of these items needs to be accurately determined in order to justify their economic feasibility, viability, as well as prove that they are imperishable (Forell et al., 2011; Li et al., 2009). Costing models can be utilised to achieve economic feasibility (Dillon et al., 2010; Ramgovind et al., 2010). Also, activities in optimisation of resources or creating strategies for profitable pricing and licensing can lead to high level of profits (Rafique et al., 2011).

One key consideration of an organisation intending to take on CC is conducting a comparative analysis between the cost of staying within hardware systems and the cost of transferring to the cloud (Cardoso & Simões, 2012; Greenberg et al., 2009). This comparison must include expenses related to cost factors such as increase of Internet bandwidth for efficiency and feasibility and reassigning remote business features to the cloud (Kim, 2009; Kondo et al., 2009). Costs are usually aggravated for data-intensive applications, such as media applications (Dey, 2012; Kondo et al., 2009).

- **Infrastructure**

The fourth category of challenges and issues involves concerns about the hardware and software infrastructure for cloud based services (Mathur, 2010). Complications occur either in networking areas, including traffic management (Savu, 2011), network agility and cost (Zheng, 2011), or in resource planning, for example dynamic resource supplying (Goyal, 2010), and scaling (Forell et al., 2011). The most critical issues relate to server allocation optimisation and load balancing (Kusaka et al., 2011), both of which are elements of the broad dilemma of effectiveness.

An immense amount of energy is required for operating large-scale infrastructure (Forell et al., 2011); concerns including infrastructure design (Kim et al., 2009; Goyal, 2010) and virtualisation (Min et al., 2011) have been emphasised. Infrastructure characteristics, including accessibility (Wei & Blake, 2010), dependability (Jadeja & Modi, 2012) and expandability (Patibandla et al., 2012) have been speculated.

Due to the lack of faith and the risk of data exposure to a potentially unreliable environment, normally government organisations prefer not to store data in the cloud; which indicates that these organisations are frequently bound by concerns related to data sovereignty for hosting their programs or data within the boundaries of a specific geography. Thus, the prime challenge in such conditions is for the selected cloud environment to be able to provide trusted and secure storage. Generally, current software systems are comprised of various parts and sub-systems, such as business services, database layers, client applications, message queuing, as well as being web-fronted. As a result, these types of systems generally have firm quality of performance, reliability, security and trust. Because of that, monitoring and maintaining of service quality is a major challenge for fulfilling SLA between the customer and the cloud application owner (Department of Innovation Industry Science and Research, 2011).

In light of the above, this section of the current research discussion aims to investigate the challenges and issues that influence the adoption of CC in ARMGs. There appears to be a dearth of empirical studies that have been conducted to assess the challenges and issues within the ARMGs. There are many challenges and issues in adopting new technology, like CC technology, which requires increased awareness. ARMGs encourage for more research to explore the challenges and issues that face the adoption of CC (Department on Innovation Industry Science and Research, 2011). The main reason for the ARMGs to encourage more research is to enhance the adoption rate of CC within ARMGs.

Although most of the published works are based on the academic experiences, this research aims to capture the industrial experience of people within IT in Queensland local councils. These industrial experts will be included in this research due to their level of knowledge and proficiency within the realm of CC adoption. Including these industrial experts may help to discover many new challenges and issues that will highly contribute to this research and at the same time may open new research areas for the future candidates.

2.3.6 E-Government and Cloud Computing

Several arguments have been observed among researchers in the field IT/IS in regards to the definition of e-government, primarily on the basis of the short duration within which this modernism has existed inside the realm of technology and technology review. The published literature provides many definitions of e-government: e-government from the technical aspect is described as technological practice of government, mainly web-based Internet applications, through which constituents, employees, corporate partners, government entities and other agencies can easily access the desired government information (McClure, 2000). Otherwise, e-government is also defined as the use of IT, particularly telecommunications, which government agencies use to provide information and services to people, companies, employees and government departments in an improved, efficient, effective and desirable way (Carter & Belanger, 2004).

Expanding and reshaping any type of information exchange among concerned participants, such as governmental agencies and companies as well as their clients, dealers or other partners, can be referred to as e-government (Wassenaar, 2000). From the political point of view, e-government has the potential for government organisations to have a strong liaison with its citizens, to re-arrange themselves and collaborate with diversified cultures (Dunleavy, 2002). To improve constituency input and government service delivery, the revolution of public sector through IT and net-enabled operations would also be known as e-government (Fraga, 2002).

Many positive aspects are linked with the application of this technology, such as improved contacts with industry, effective delivery of government services to the populace, a more efficient government management and citizen empowerment through information access. Increased transparency, less fraud, uplifted revenue, greater ease and cost cutbacks are the desired outcomes (The World Bank E-Government, 2002).

Via the use of modern IT and e-government, information and services are delivered by the public sector organisations to the general public and industry sectors. Desirable output is achieved by increasing their productivity and worth and enabling interaction between citizens and government organisations. An important point is: the e-government system should be easy to maintain, reliable, satisfactory and cost efficient, if it is to be developed by government organisations who will be investing a considerable amount of capital (Tripathi & Parihar, 2011). Many challenges are also faced by e-government, mainly budget reductions for the ICT, continuous advances in technology as well as the increasing public demand for services and information (Tripathi & Parihar, 2011). For e-government, the innovative ideas must be accepted by the administrations and supported by advanced computing tools. The government organisation can be forced to try to reduce expenditures as well as limiting their ICT budget, due to the current financial crunch. It has become hard for the conventional e-government model to operate successfully in such conditions.

The use of IT by e-governments for the delivery of public services to citizens, industries and other public service departments has already been discussed. Improving and upgrading the productivity of the organisations is the decisive goal of any government, so that the best possible services can be delivered to their participants; namely its citizens, other public service departments and industries (Alshomrani, 2012).To accomplish these two goals, governments came under growing pressure in the 1990s. E-government concepts were the preferred model. For delivering proper services to its people and companies and cooperating with other governments, optimum use of modern computing technologies is being sought by almost every nation across the globe. E-government is effective; and its effectiveness can be further enhanced by introducing new innovative computing technologies such as CC.

2.4 Technology Innovation Adoption

Innovation is the most significant business challenge (Hamel, 2002), it is seen as increasingly essential for development and viability (Tidd, 2001). Adoption of innovation is the production, development, and adaptation of new concepts on behalf of the firm (Damanpour, 1991; Higgins, 1995), either as an anticipatory act to control the environment, or as a response to the environment. It can completely change the nature of an organisation (Damanpour, 1996; Grover, 1993) and from an IS perspective, can involve new practices or operational ideas (Annukka, 2008; Lind & Zmud, 1991). IT can affect firm productivity (Caldeira & Ward, 2003; Oliveira & Martins, 2011) and new technologies are developing constantly (Jasperson et al., 2005; Shiels, 2003; Wang et al., 2011).

The implementation of new innovations is explored in the study of the diffusion of innovations (Rogers, 2003), which draws on sociology and psychology (AlQaisi, 2009). Challenges are associated with the implementation of new technologies as reflected in IT/IS innovation adoption studies (Jeyaraj et al., 2006; Korpelainen, 2011; Lacity & Willcocks, 1998).

Innovation adoption can be studied from both the individual and firm levels (Slappendel, 1996); the concept of innovation first started to appear in the 1950s (Zaltman et al., 1973) and was accelerated by new communication technologies in the 1980s (Van De Ven & Rogers, 1988).

2.4.1 Barriers to Technology Innovation Adoption

Internal resistance to alteration can limit internal and external forces of change from encouraging innovative practices. There are many barriers that unconstructively influence an organisation's technology innovation adoption.

- **Innovation process mismanagement**

The study conducted by Oke (2004) found a hurdle to innovation management in terms of the absence of an effectual innovation development procedure. The command-and-control rational model is considered to be a fundamental cause of the issues within team functioning (Ashmos & Nathan, 2002). Although today's business environment is spectacularly multifaceted, rapidly changing and more impulsive, this model still remains relevant and of importance. Even in extremely disorderly surroundings, teams should always be ready to confront, inquire, and encourage as required.

- **Inability to unlearn**

The procedure through which individuals and organisations replace standard practice with something novel is known as unlearning (Sinkula, 2002; Baker & Sinkula, 2002). Generative and meta-learning execution and questioning suppositions is a senior order learning reached via unlearning (Baker & Sinkula, 2002).

- **Obsolete mental models and Theory-In-Use**

The varying situation or competitive state of affairs no longer accommodates rational models, entity and firm-wide values about the globe and how to understand it, rather it changes the advancement of the present theory, the implicit information method of the business. Progression of disruptive innovations is held back by it (Baker & Sinkula, 2002). Outcasts and distinct circumstances typically create ground-breaking technologies, burst through commerce models and disruptive innovations, not the prevailing cast list whose own victory ensnares them.

- **Internet connectivity**

There are many challenges to the adoption of IT/IS. Technology needs to be appropriate to the "temperament" of a particular business and is one factor associated with firms failing to accept IT services (Parida et al., 2010). Organisations that presume Internet technology was not appropriate for them will not enjoy the potential benefits (Parida et al., 2010).

- **Cost for developing and maintaining systems**

It is difficult for an organisation to proceed to adoption where the business case does not support it that is where the anticipated benefits do not exceed the investment cost. Additional costs and risks cannot always be anticipated, there can be risks of dependency on particular staff.

2.4.2 Models of IT/IS Adoption

There are many different theories used in IT/IS research (Hands, 2009). This section divides the IT/IS innovation and adoption theories into two separate levels, individual and firm level theories. An example of key theories applied to study the adoption of IT/IS innovation and adoption at the individual level included: Technology Acceptance Model (TAM) (Davis, 1989; Davis et al., 1989); Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003); Theory of Planned Behaviour (TPB) (Ajzen, 1985, 1991, 2002); Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975). An example of key theories applied to study the adoption of IT/IS innovation and adoption at the firm or organisational level included: Diffusion on Innovation (DOI) (Rogers, 1995); Institutional Theory (Scott & Christensen, 1995; Scott, 2001); Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990).

Table 2.1 illustrates the theories classification and explains the main important details of the technology innovation adoption theories.

Table 2.1: Details of the technology innovation adoption theories

Level	Theory	Principle of the Theory	Author
Individual Level Theories	TAM	Perceived usefulness Perceived ease of use	Davis (1989) Davis et al. (1989)
	UTAUT	Performance expectancy Exertion anticipation Social impact Facilitating conditions	Venkatesh et al. (2003)
	TPB	Attitude toward the behaviour Subjective norms Behavioral control	Ajzen (1985,1991, 2002)
	TRA	Attitude towards behaviour Intention Subjective norms	Fishbein and Ajzen (1975)
Firm Level Theories	DOI	Individual characteristics Internal characteristics of the organisation External characteristics of the organisation	Rogers (1995)
	Institutional Theory	Attitude towards behavior Intention Subjective norms	Scott and Christensen (1995) Scott (2001)

	TOE	Technology Context Organisation context Environment context	Tornatzky and Fleischer (1990)

2.4.2.1 Individual Level Theories

In this part the researcher summarised the main significant theories applied to study the adoption of IT/IS innovation and adoption at the individual level, these include: TAM (Davis, 1986; Davis, 1989; Davis et al., 1989); UTAUT (Venkatesh et al., 2003); TPB (Ajzen, 1991, 2002); TRA (Fishbein & Ajzen, 1975).

- ***Technology Acceptance Model (TAM)***

The TAM is one of the better-known models broadly utilised in the investigations of the determinant of IS/IT acceptance (Davis, 1989; Davis et al., 1989). TAM is derived from TRA (Fishbein & Ajzen, 1975) which offers an explanation for user acceptance and usage behaviour of IT. Several past studies have accepted and extended this model that was observationally demonstrated to have high legitimacy (Adams et al., 1992; Chau, 1996; Igbaria et al., 1997; Lee et al., 2005; Liu et al., 2005; Mathieson, 1991; Pituch & Lee, 2006; Segars & Grover, 1993; Venkatesh & Davis, 2000). TAM hypothesises that an individual's behavioural plan to accept a framework is dictated by two convictions: perceived usefulness and perceived ease of use (Legris et al., 2003). For more details see Figure 2.7.

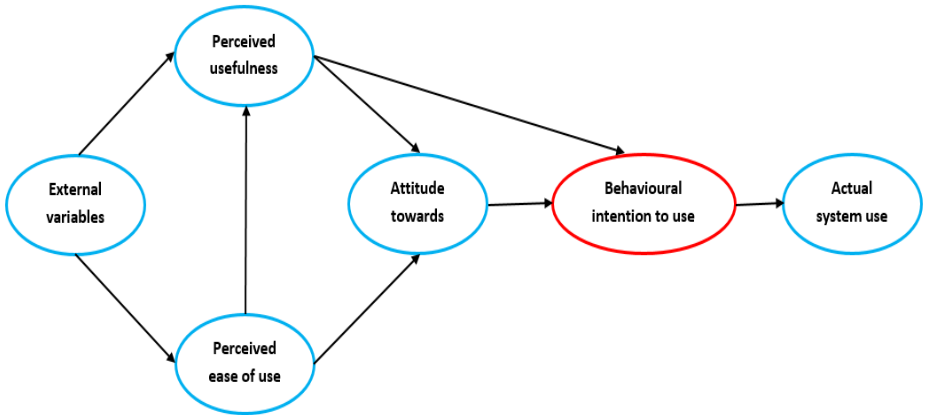


Figure 2.7: Technology Acceptance Model (TAM)
(Davis, 1986; Davis, 1989; Davis et al., 1989)

According to Davis (1989), perceived usefulness is the extent to which an individual considers that using a certain system has the potential to improve his/her productivity. Whereas the perceived ease of use is the level of an individual's understanding on how using a certain system would be free of effort. Of the two concepts mentioned above, perceived ease of use has a close correlation and a direct effect on both technology usage and perceived usefulness (Adams et al., 1992; Davis, 1989).

TAM helps in understanding variation in behavioural intention in a procurement setting and this is partially because TAM employs two particular beliefs that are applicable in different situations (Gentry & Calantone, 2002). The use of TAM to understand technology acceptance by users has been quite widespread, however the suitability and exhaustiveness of TAM has been questioned by an increasing number of people. There is some criticism of the model's assumption that users' approval of technological systems is always mainly determined by perceived ease of use and perceived usefulness (Park et al., 2008). Davis (1989) has asserted that further determinants need to be examined which may affect perceived ease of use and usefulness and this could have an impact on the model's predictive power with respect to the acceptance of technological innovation adoption. TAM is seen to have limited predictive power and should be expanded to incorporate further constructs that can provide better explanation of the behavioural intention to implement ISs (Legris et al., 2003; López-Nicolás et al., 2008).

A limitation of TAM is the restricted assistance regarding how to impact convention by plan and execution as presented by the TAM theory and this is a major drawback (Taylor & Todd, 1995; Venkatesh et al., 2003). TAM states only a limited number of factors for acting although an executer may consider several factors that may possibly divert his/her goal or choice (Bagozzi, 2007). The collective, intellectual, or communal aspects of technology acceptance are not taken into consideration in this theory (Bagozzi, 2007).

- ***Unified Theory of Acceptance and Use of Technology (UTAUT)***

The united theoretical foundation provided to support study on the field of IS/IT adoption is the UTAUT. The UTAUT was proposed by Venkatesh et al. (2003) after conducting a comparative analysis of prominent models such as TRA, TAM, and TPB, all of which have been used for explaining technological behaviour. UTAUT is one of the most extensively utilised theories for studying the adoption of IS within the discipline of IT (Dinev et al., 2007; Dwivedi et al., 2008; Dwivedi et al., 2009; Gu et al., 2009; Williams et al., 2009). According to Venkatech et al (2003), four core constructs are proposed by the theory: performance expectation, exertion anticipation, social impact and facilitating conditions (as demonstrated in Figure 2.8).

- ***Performance expectancy*:** It is the extent to which individuals are of the view that the expectancy system is going to allow him/her to exhibit better job performance.
- ***Exertion anticipation*:** The extent to which the system can be utilised with ease.
- ***Social impact*:** The extent to which individuals believe that their peers and colleagues support using the system.
- ***Facilitating conditions*:** The extent to which the individual believes that the organizational context and technical infrastructure support using the system.

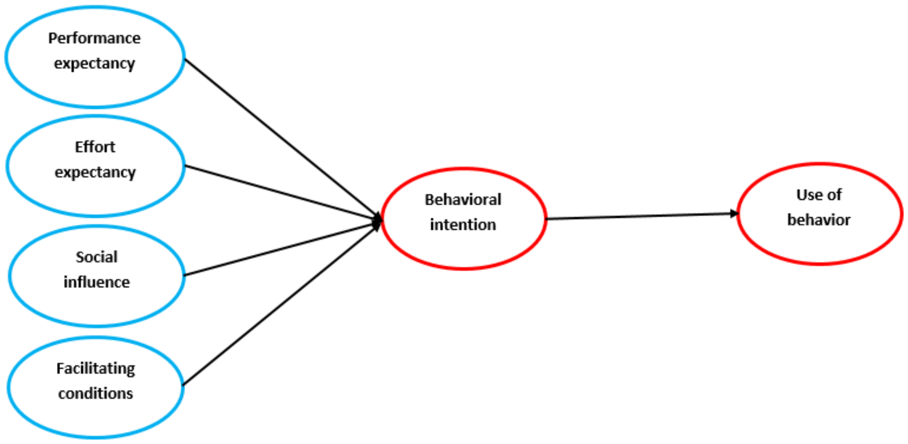


Figure 2.8: Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003)

Users will have different beliefs and perceptions about the technology which will subsequently have an impact upon their intentions to use technology, which would then impact upon willingness to adopt (Garfield, 2005). UTAUT has been found to justify almost 70 percent of the variation in usage intention (Venkatesh et al., 2003). This model has been taken into account in various studies to elaborate upon and test the invariance of the measurement scale employed in the UTAUT instrument. The most important limitation of UTAUT is the large number of independent variables (Bagozzi, 2007).

- ***Theory of Planned Behaviour (TPB)***

The TPB is an enhancement of the hypothesis of reasoned action dependent upon the supposition that human beings are normally quite logical and efficiently use the data available to them (Ajzen, 1985). TPB theory has been used in many IS studies (Brown

& Venkatesh, 2005; Riemenschneider & McKinney, 2001). The hypothesis asserted that individuals determine elements before choosing to engage or not engage in conduct (Intent factor). The change in intention is made of three universal constructs such as: attitude toward the behaviour, subjective norms and behavioural control (Taylor & Todd, 1995), see Figure 2.9. Each of these universal constructs will be explored below (Ajzen, 1985):

- ***Attitude toward the behaviour***: This pertains to the negative or positive attitude of an individual regarding exhibiting the behaviour. It is obtained by examining the feelings of the individual about the impact of the behaviour and assessing the benefits of these behaviours.
- ***Subjective norms***: This pertains to the beliefs of an individual about whether those close to the person are in support of executing the behaviour. The weighting given to the point of view of any particular referent depends on the extent to which the individual believes that he/she has to fulfil the wishes of the referent.
- ***Behavioural control***: This pertains to an individual's beliefs about the difficulty or ease with which the behaviour can be carried out. The degree of control possessed by people lies on a scale that extends from the behaviours that can be carried out easily to those that are difficult to perform and require several resources. This element was incorporated to take into account all non-controllable factors regarding the behaviour.

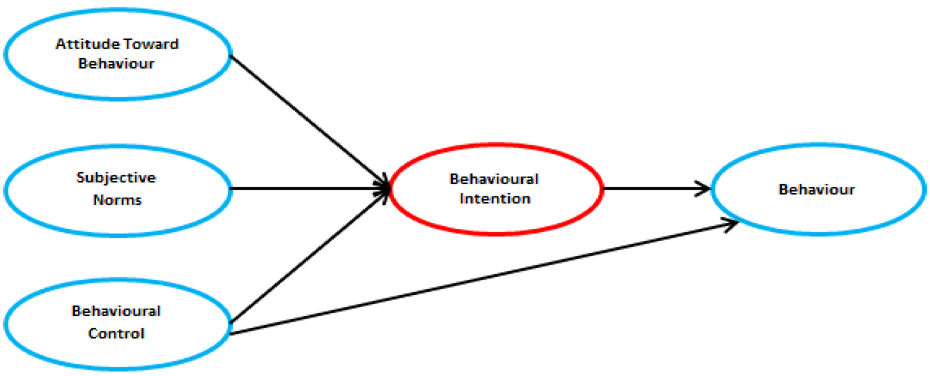


Figure 2.9: Theory of Planned Behaviour (TPB)
(Ajzen, 1991, 2002)

Intentions have a significant contributory impact on behaviour (Webb & Sheeran, 2006). A wide meta-analytic review of 37 studies that specifically controlled intention through mediation and evaluated impact on ensuing behaviour (Webb & Sheeran, 2006).

- ***Theory of Reasoned Action (TRA)***

The TRA is aimed at obtaining a comprehensive understanding on the relationships among human intentions, attitudes and behaviours (Glanz et al., 2008). Based on the assumption of the theory, it is believed that individuals generally behave logically and methodically when using the available information (Ajzen & Fishbein, 1980). The theory is applied in an extended level to social psychology in relation to the factors defining the intended behaviour (Ajzen & Madden, 1986). Ajzen and Fishbein (1980) pointed out that individuals decide and evaluate the consequences of their actions prior to taking part in any given behaviour. TRA can be used to assess the implementation of IS within organizations (Liker & Sindi, 1997; Bagchi et al., 2003). Behavioural intention is considered to be the key dependent construct within the TRA. The key independent constructs in the model include behaviours and subjective norms that are separate from attitude. In this theory, the key variables are: attitudes towards behaviour; subjective norms and intention (Ajzen & Fishbein, 1980). These variables are going to be discussed in detail as follows (Ajzen & Fishbein, 1980):

- ***Attitude towards behaviour*****:** This pertains to the extent to which a particular behaviour is considered positively or negatively. Human perceptions about the implications of the said behaviour are evaluated and the suitability of these implications is examined for this purpose.
- ***Intention*****:** This pertains to an individual's willingness to carry out certain behaviours and is believed to occur right before behaviour is carried out.
- ***Subjective norms*****:** These pertain to the impact of the social environment on behaviour. This is discussed in detail below.

Subjective norms normally pertain to an individual's beliefs about what the people close to them think about performing or not performing the desired behaviour (Ajzen & Fishbein, 1980). TRA presumes that the perceived expectations of a particular referent group, or individual, decides what the typical subjective norms would be, as well as the individual's desire to fulfil these expectations. The contribution of the perception of any particular referent is considered keeping in view the desire of the individual to follow what the referent desires (Eagly & Chaiken, 1993). TRA has been considered with respect to the use of technology in various studies.

Behaviour is not always under volitional power and this theory could be considered to make a false supposition and consequently it may only be applicable to behaviour that is deliberately planned (Al-Qeisi, 2009). The Theory of Perceived Behaviour, comprising professed behavioural charge as an additional constituent has been composed by Ajzen (2002) in an effort to overcome the deficiency of this model.

- ***Empirical studies of the individual level theories***

This section investigates the individual theories and proposes an extensive account of studies that draw on these theories. Most of the significant studies have used the TAM theory to understand different IT/IS adoptions such as: personal computing acceptance (Igbaria et al., 1997); internet-based learning medium (ILM) (Lee et al., 2005) and the e-learning system (Pituch & Lee, 2006). The UTAUT theory has been used to understand different IT/IS adoptions such as mobile banking (Gu et al., 2009); and the model of 3G mobile telecommunication users (Wu et al., 2008).

The TPB theory has been used to understand different IT/IS adoptions such as: PC adoption in households (Brown & Venkatesh, 2005). The TRA theory has been used to understand different IT/IS adoptions such as technology implementation (Liker & Sindi, 1997): and global e-tailing (Lee & Littrell, 2005).

Table 2.2 illustrates and summarises the main significant examples of TAM; UTAUT; TPB; and TRA based studies and outlines the main analysed variables to each study. This is then followed by the data collection methods and the data analysis methods, that each study employed, and the main findings of each study.

Table 2.2: Empirical studies of the individual level theories

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
Personal Computing Acceptance Igbaria et al. (1997)	**TAM**	• Perceived usefulness • Perceived ease to use • Intra-organisational factors: internal computing support; internal computing training; management support • Extra-organisational factors: external computing support; external computing training	Partial Least Squares (PLS)	Survey 358 users in small firms New Zealand	The findings indicate that perceived ease of use is a dominant factor in explaining perceived usefulness and system usage, and that perceived usefulness has a strong effect on system usage. The results indicate that exogenous variables influence both perceived ease of use and perceived usefulness, particularly management support and external support.
Internet-Based Learning Medium (ILM) Lee et al. (2005)	**TAM**	• Perceived usefulness • Perceived ease to use • Perceived enjoyment	Structural equation modeling (SEM)	Questionnaires 544 student university in Hong Kong	The results showed that both perceived usefulness and perceived enjoyment played an important role in affecting student attitude and intention to use ILM. Attitude was found to have a significant impact on student's intention to use ILM. Surprisingly, perceive ease of use did not posit a significant impact on student attitude toward ILM usage.
E-Learning System Pituch and Lee (2006)	**TAM**	• External variables: system functionality; system interactivity; system response; self-efficacy; and internet experience • Perceived usefulness • Perceived ease to use	SEM	Survey 259 student university in Taiwan	This study proposed and validated a research model that demonstrated the importance of specific e-learning system characteristics. This study represents an initial step in • Highlighting specific system factors that appear to promote system use. • Identifying how such system factors impact use of an e-learning system for both supplementary learning and distance education purposes
Mobile Banking Gu et al. (2009)	**UTAUT**	• Perceived ease to use • Behavioral intention • Social influence • System quality • Facilitating conditions • Self-efficiency • Trust • Familiarity	SEM	Survey 910 usable responses	The results indicated strong support for the validity of proposed model with 72.2% of the variance in behavioral intention to mobile banking. This study found that self-efficiency was the strongest antecedent of perceived ease-of-use, which directly and indirectly affected behavioral intention through perceived usefulness in mobile banking. Structural assurances are the strongest antecedent of trust,

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
		• Situational normality			which could increase behavioral intention of mobile banking.
Model of 3G mobile telecommunication users Wu et al. (2008)	**UTAUT**	• Performance Expectancy (PE): perceived usefulness; extrinsic motivation; job-fit; relative advantage; outcome expectations • Effort Expectancy (EE): perceived ease of use; complexity; ease of use • Social Influence (SI): subjective norm; social factors; image • Facilitating Conditions (FC): perceived behavioral control; facilitating conditions; facilitating conditions	KMO Bartlett's test, Cronbach's Alpha, SEM	Questionnaires	The results of this study show that, PE has positive influence towards BI and UB FC has positive influence on Bl and UB. Sl has positive influence on Bl and UB. BI has positive influence on UB EE did not influence BI.
PC Adoption in Households Brown and Venkatesh (2005)	**TPB**	• Attitudinal Beliefs: applications for personal use; utility of children; utility for work-related use; applications for fun; status gains. • Normative Beliefs: friends and family influences; secondary sources' influence; workplace referents' influences • Control Beliefs: fear of technological advances; declining cost; cost; perceived ease to use; requisite knowledge	PLS	Survey 1247 households	This research resulted in a powerful model of household technology adoption that accounted for 74 percent of the variance in intention to adopt a PC, compared to 50% for the baseline MATH. The results demonstrated that the influence of attitudinal beliefs varies by life cycle stage. Further, income interacts with the normative and control beliefs within life cycle stage. The research in household adoption of PCs and other innovative technologies for the household will need to account for life cycle factors. Contrary to popular belief, income, although influential, is not the sole driver of non-adoption.
Technology Implementation Liker and Sindi (1997)	**TRA**	• Behavioural outcomes: intentions to use the system • Attitude variable: attitudes towards system use • Beliefs variable: perceived impact on job security; perceived impact on career progress; perceived impact	Path analysis and SPSS-X package	Questionnaires 94 users and non-users US accounting firms	The results supported several hypotheses. Intentions to use the system were influenced by social norms encouraging system use and by perceptions of the impacts of system use on valued skills, controlling for the effect of attitudes. Attitudes toward use of the system were affected by the perceived usefulness of the system and its impacts on valued skills. Attitudes were strongly related to ease of

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
		on valued skills; subjective norms encouraging system use; perceived usefulness of the system' • Exogenous variables: perceived ease of use‘; need for cognition'			system use, an unanticipated finding. The most surprising result was that general attitudes were not found to predict intentions to use the system.
Global E-Tailing Lee and Littrell (2005)	**TRA**	• Internet shopping values • Attributes of the web site cultural products • Attribute toward shopping for cultural products on the Internet	FA	Web survey 203 persons	Consumers' beliefs about the web site, especially with regard to merchandising, both directly and indirectly influenced their intention to shop for cultural products in the future. The proposed model supported the effectiveness of the extended TRA in the context of cultural product shopping on the internet. Overall, the findings confirmed elements of the TRA such as belief structures as determinants of attitudes and attitudes as determinants of behavioral intention.

2.4.2.2 Organisation Level Theories

This section summarises the main theories applied to study the adoption of IT/IS innovation at the organisational level include: DOI (Rogers, 1995); Institutional Theory (Scott & Christensen, 1995; Scott, 2001); Technology-Organisation-Environment (TOE) framework (Tornatzky & Fleischer, 1990).

- ***Diffusion of Innovation (DOI)***

The DOI theory is a theory which investigates the reasons for the generation of new concepts and innovations and how quickly they diffuse throughout societies, at individual and organisational levels (Rogers, 1995). This theory visualises innovations as entities transferred through different channels over a long time frame, within a specific social framework, where people are considered to have different levels of readiness for adopting innovations, given that a certain amount of time is consumed in the adopting of new technologies (Rogers, 1995). DOI theory has been a helpful tool in understanding how organisations adopt different technological innovations, as indicated by its application in many studies (Bharati & Chaudhury, 2006; Blake et al., 2005; Fichman, 2004; Hardgrave et al., 2003; Seyal & Rahman, 2003; Sharma & Rai, 2003; Venkatesh et al., 2003; Zhu & Kraemer, 2005).

There are five classifications proposed by Rogers (1995) (from earliest to latest adopters) of individual or corporate preparedness for innovation: innovators; early adopters; early majority; late majority; and laggards (Rogers, 1995).

- ***Innovators*:** Innovators are described as gatekeepers who play a significant role in introducing a new idea and making innovation a part of the organisation. It is critical for innovators to have viable financial resources so that they can survive any potential loss incurred from an unsuccessful innovation. They should possess high levels of awareness and the ability to execute complicated technical knowledge and deal with the excessively unpredictable nature of innovation during the adoption process.
- ***Early adopters*:** This group of adopters has the following key attributes: they have the largest degree of opinion leadership in several systems compared to any other group. These individuals are the ones who people consult with before implementing any innovation. Change agents look up to this category of adopters as a local missionary that can hasten the process of diffusion. Early adopters have the ability

to reduce the extent of uncertainty about the innovation by implementing it. Lastly, early adopters help in motivating the masses when they incorporate an innovation and build consensus.

- ***Early majority*:** The early majority group is the largest of the adopter groups as they represent one-third of the members of any system. They function as the most important link between very early and comparatively late adopters. They spend relatively longer time in taking their innovation adoption decision compared to the innovators and early adopters.
- ***Late majority*:** This category comprises of the same percentage of members as the early majority group (one-third). The adoption decision of this category is affected by several factors, such as economic necessity and/or competitive pressures of those who are part of the same industry. They have comparatively fewer resources which is why they must be sure of the authenticity of the innovation and be assured about the positive outcomes of their decision before they commit to implementing the new technology.
- ***Laggards*:** Laggards are the last ones to adopt a new innovation as they are sceptical about innovations and change agents. This group does not have too much awareness and knowledge of the innovation, which they attribute to their limited resources. This group adopts a new technology only when they are completely sure of its consequences.

According to Rogers (1995), the DOI theory indicates that at the organisational level, innovativeness has relationships to sovereign variables, such as internal organisational structures, leadership dimensions and/or individual characteristics as well as an organisation's external characteristics.

1- Individual characteristics portraying the leadership behaviours related to change

2- Internal characteristics of organisational structure comprise factors such as centralisation, complexity, formalisation, organisational slack, interconnectedness and the size of the organisation (Rogers 1995) whereby:

  - ***Centralisation*** is the level at which power and control in a system are concentrated to a comparatively small number of individuals;
  - ***Complexity*** is the level of which an organisation’s members hold a comparatively high level of awareness and proficiency;

- ***Formalisation*** is the level at which an organisation compels its members to follow rules and procedures;
- ***Organisational slack*** is the extent of the availability of unallocated resources for an organisation;
- ***Interconnectedness*** is the level at which the units in a social system are connected via interpersonal networks;
- ***Size of organisation*** refers to the number of employees within the organisation.

3- External characteristics of an organisation are related to openness of the system. The innovation strategy within organisations is considerably complex and includes various personnel, which may either support or oppose the new concept, thus all personnel each play a role within innovation-decision making. For more details see Figure 2.10.

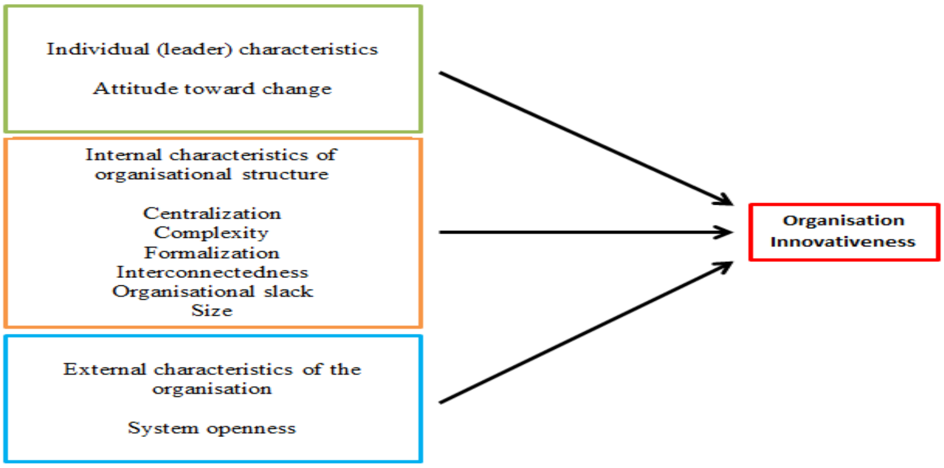


Figure 2.10: Diffusion of Innovation (DOI)
(Rogers, 1995)

The development of adoption and diffusion literature has led to the identification of characteristics of innovation, after great efforts to study adoption were expended to determine the features of various adopter groups (Rogers, 2003). However, the variations in innovation and technology have not been studied to a large extent. Rogers (2003) has described the features of innovation as following:

- ***Relative advantage***: The extent to which an innovation is believed to be more profitable that the idea it succeeds.
- ***Observability***: The extent to which the innovation outcomes are apparent to others.
- ***Compatibility***: The extent to which it is believed that an innovation conforms to the existing beliefs, past experiences and the requirements of prospective adopters.

- ***Trial-ability*****:** The extent to which the innovation can be tested on a limited scale.
- ***Complexity*****:** The extent to which the innovation is believed to be comparatively difficult to comprehend and implement.

It is highly likely that, in general, companies decide to adopt only those innovations that have clear benefits, do not have a significant impact on current practices, are not too complicated and can be easily understood. Therefore, when the innovation has a high comparative edge and compatibility, the rate of diffusion is positively influenced. On the other hand, observability and trial-ability have a positive relationship with risk and may lead to greater uncertainty of the adopters regarding the technology (Fichman & Kemerer, 1993). Difficulties are faced when these attributes are measures for innovations or technologies, as they may not be the most important perceived attributes for adopters in all the situations. It has been asserted by Rogers (2003) that studies which use these characteristics must obtain a significant feature of a new innovation from respondents as a first step to measuring the attributes, as determinants of the adoption rate.

By offering vital tools that assist in forecasting the probability rate of implementation, DOI Theory has appreciably added to existing implementation and dissemination research and this remains one of its main limitations. One criticism of Rogers' work is that the theory shows no verification of the way manner grows into a refusal or acceptance (Karahanna et al., 1999; Chen et al., 2002). In the context of enlightening the implementation behaviour of multifaceted organisational technologies, studies concerning multifaceted organisational technology have questioned the deficiency of the characteristics of the DOI theory (Prescott & Conger, 1995; Chau & Hu, 2002). These characteristics could be considered necessary to bring forth the main feature of a novel innovation, using the respondent as a preceding measure to determining these characteristics as those that anticipate the adoption rate (Rogers 2003). Research may need to take into account societal contexts so that that this theory may be more practical (Parker & Castleman, 2009). It is recognised that it may be more helpful to put together DOI with new theories in the course of further studies to explore novel innovation adoption in industries.

- ***Institutional Theory***

Within institutional theory, institutional settings are critical in determining the organisational structure and actions (Scott & Christensen, 1995; Scott, 2001). The theory asserts that rational objectives of efficiency do not entirely motivate organisational decisions; rather, social and cultural factors have an impact in addition to apprehensions about authenticity. It is the cultures, structures and procedures that shape the institutions' actions. According to the theory, greater levels of similarity between firms are obtained due to isomorphic pressures and the pressure for legitimacy (Dimaggio & Powell, 1983). This suggests that firms belonging to the same industry have a tendency to become homologous with the passage of time, because competition in the industry and pressure from customers drives them to follow industry leaders. Instead of being completely driven by internal decisions to implement e-commerce, for example, it is more likely that firms adopt and implement e-commerce due to isomorphic pressures from customers, competitors, government and trading partners (Garud et al., 2002).

An institutional approach to e-commerce or electronic data interchange (EDI) diffusion and integration has been adopted in recent studies (Chatterjee et al., 2002; Crook & Kumar, 1998; Gibbs & Kraemer, 2004; Iacovou et al., 1995; Yu-hui, 2008; Purvis et al., 2001; Soares-Aguiar& Palma-Dos-Reis, 2008; Teo et al., 2003). Mimetic, normative and coercive institutional forces are present in an institutional setting that has an impact on the organisation's attitude towards an IT-based inter-organisational system (Teo et al., 2003). When firms adopt a practice or innovation in line with competitors, they are said to be acting under mimetic pressures (Soares-Aguiar & Palma-Dos-Reis, 2008). On the other hand, coercive pressures are those formal or informal forces that other organisations exert on the firms who are dependent upon them (Dimaggio & Powell, 1983). Normative pressures are a product of dyadic relationships in which companies share information, rules and customs to some extent. When these customs are shared by means of relational channels between members of a network, agreement is obtained, which then leads to the consolidation of these customs and their potential impact on organisational behaviours (Powell & Di Maggio, 1991).

The institutional theory has been integrated with other theories, such as TOE model, in a few studies (Gibbs & Kraemer, 2004; Soares-Aguiar& Palma-Dos-Reis, 2008). The institutional theory augments the environmental side of the TOE model regarding external pressures, including pressure from competitors and trading partners.

- ***Technology-Organisation-Environment (TOE) Framework***

The TOE framework was invented in 1990 (Tornatzky & Fleischer, 1990). The TOE framework stands for evaluating how the firm context affects the technology innovation adoption (Baker, 2011). It demonstrates that implementation of IT technology by organisations is influenced by three varied contextual groups namely: technological, organisational, and environmental (Baker, 2011; DePietro et al., 1990; Melville & Ramirez, 2008; Tornatzky & Fleischer, 1990).

Initially, the context of technology denotes the characteristics of innovation, which are accessibility, similarity and unpredictability; all of which affect the process of adoption of innovation (Baker, 2011; Low et al., 2011; Melville & Ramirez, 2008). It denotes both internal and external features, which can both impact the organisation (DePietro et al., 1990; Doolin & Troshani, 2007). The organisational context represents the characteristics of an organisation such as size, management structure, level of formalisation, human resources, level of slack assets, level of complexity as well as connections around representatives (DePietro et al., 1990; Low et al., 2011). The environmental context is comprised of industrial structure, competitors, government rules and regulations and approaches (DePietro et al., 1990). For more details see Figure 2.11. Indeed, within this context, the association between organisations and exchanging accomplices, contenders, government, pressure from trading partners, and industry group may manipulate adoption decisions (DePietro et al., 1990; Melville & Ramirez, 2008). To get favourable circumstances in the commercial centre, the more compelling the rivalry in a business, the more weight is on an organisation to embrace other innovation and technology (Doolin & Troshani, 2007). The TOE framework has been a helpful tool in understanding how firms adopt different technological innovations, as indicated by many studies (Hackney et al., 2006; Kuan & Chau, 2001; Lin, 2009; Ryan et al., 2000; Sharma & Citurs, 2005; Zhu et al., 2006a).

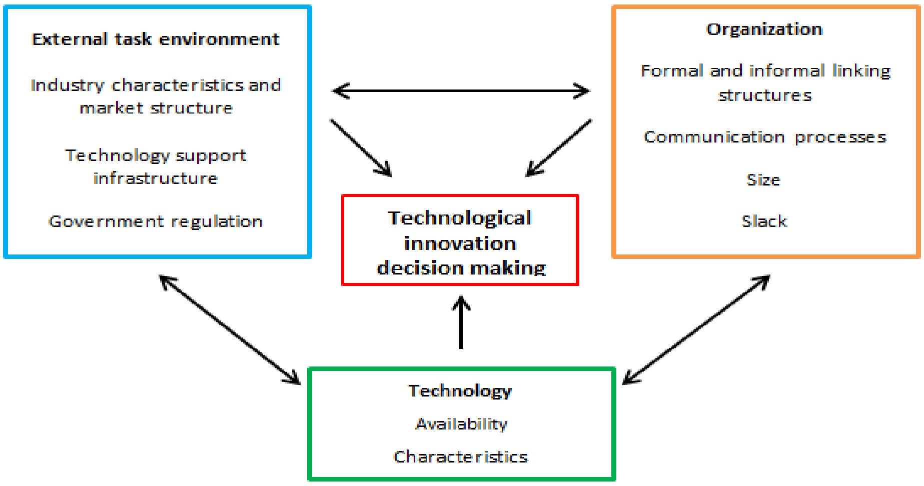


Figure 2.11: Technology-Organisation-Environment (TOE) framework (Tornatzky & Fleischer, 1990)

The TOE framework shows that adoption of any technology by firms or organisations is affected by three diverse context groups: technological, organisational and environmental contexts (DePietro et al., 1990; Melville & Ramirez, 2008).

1. Technological context

Technological context refers to the technological characteristics available within the organisation for the adoption of technology such as: relative advantage; uncertainty; compatibility; complexity; trial-ability; cost effectiveness; and technology maturity.

- ***Relative advantage*** is the degree whereby innovation is professed as being more superior to the idea it supersedes (Rogers, 2003). Relative advantage is the extent to which a technical feature is professed to offer an advantage over an established existing system (Low et al., 2011; Lee, 2004). This is comparable to TAM's 'perceived usefulness', which describes the advantages made possible by utilising the system (Moore & Benbasat, 1991). Relative advantage is considered a vital point for acceptance of a new IT/IS innovation. The greater the need, the greater the chances for acceptance of the innovation by a firm (Lee, 2004; Rogers, 2003). The influence of relative advantage on know-how acceptance has been extensively studied (Gibbs & Kraemer, 2004; Lee, 2004; Premkumar & King, 1994; Thong, 1999).
- ***Uncertainty*** is the extent to which the outcomes of utilising an innovation are insecure (Ostlund, 1974). It is the acceptance that new know-how entails threat and ambiguity (Erumban & De Jong, 2006), and is the degree to which the outcomes of utilising an innovation can be assured (Ostlund, 1974). Perceived and real

security risks made possible via the Internet are a vital feature obstructing the utilisation of IT know-how (Kalakota & Whinston, 1996).

- ***Compatibility*** is the extent to which innovation is coherent with the user's existing traditions, procedures and technical needs (Rogers, 1995). From a business standpoint the innovation has to be well-matched with the standards and technical needs of the firm accepting it (Lertwongsatien & Wongpinunwatana, 2003). Extensive research is available on compatibility that is viewed as a vital deciding factor of IT/IS innovation acceptance (Ching & Ellis, 2004; Daylami et al., 2005; Premkumar & Roberts, 1999; Teo et al., 1997). In 166 small organisations in Singapore, Thong (1999) noted that compatibility played a vital role in acceptance of IT/IS. Furthermore, compatibility is a vital factor in the post-adoption phases of innovation distribution (Zhu et al., 2006b).
- ***Complexity*** is the extent to which an innovation is professed as relatively complicated to comprehend and utilise (Rogers, 2003), and is the level of hurdles that customers face while utilising an innovation (Jianyuan & Zhaofang, 2009). The difficulty of an IT structure has an unconstructive association with the ultimate acceptance of the system (Jianyuan & Zhaofang, 2009; Puri & Bansal, 2013). Complexity has an unconstructive influence on accepting innovation (Low et al., 2011). Innovations have to be user-friendly to augment the acceptance rate (Sahin, 2006). In several researches complexity is considered a vital feature in the acceptance choice (Chaudhury & Bharati, 2008; Harindranath et al., 2008; Thong, 1999; Tiwana & Bush, 2007).
- ***Trial-ability*** is considered the basic element in accepting an innovation (Kendall, 2001; Rogers, 2003). The trial-ability is a vital factor impacting acceptance of Internet and online education (Hsbollah & Idris, 2009). Some are of the opinion that it is insignificant (Hsu et al., 2007). The results revealed that the trials decreased the perception of hazards and moved the firm to utilising Linux in their open source policy. All through the procedure of the acceptance resolution, reinvention occurs during trials of new know-how (Sahin, 2006). Trial-ability is more important when surveying novel innovations (Rogers, 1995).

2. Organisational context

The organisational context is defined in terms of resources available to support the adoption of the innovation (Lippert & Govindarajulu, 2006). The organisational context include: firm size; top management support; innovativeness; prior technology experience and technology readiness (Tornatzky & Fleischer, 1990).

- ***Organisation size*** is the dimension of the organisation, workforce, market share and capital invested. Size is vital for an innovator profile (Rogers 2003). Size has been the focus of researches viewing IT/IS innovation acceptance (Buonanno et al., 2005; Dholakia & Kshetri, 2004). Nevertheless, experimental findings are mixed (Lee & Xia, 2006). Some studies reveal negative association while some report insignificant association (Aiken et al., 1980; Grover & Goslar, 1993). Large companies have the resources to adopt innovations and at the same time, small companies could adopt innovations as they are more flexible (Damanpour, 1992), than larger companies (Oliveira & Martins, 2011). IT/IS acceptance requires coordination that is easier within small companies (Premkumar, 2003).
- ***Top management support*** is the allocated time made available to the ICT program in proportion to expenditure, capability, reviewing plans, follow up on outcomes as well as supporting the management quandary engaged in incorporating ICT within the business' management procedure (Young & Jordan, 2008). Top management support is also defined as organisational support which ensures resources for innovation (Oliveira & Martin, 2010). Innovations that have organisation backing are accepted effortlessly. In addition, it is vital for the triumphant incorporation of novel technical innovation in firms (Daylami et al., 2005; Eder & Igbaria, 2001; Premkumar & Michael, 1995), since its significance can be informed to beneficiaries and enable availability of adequate resources (Daylami et al., 2005; Premkumar & Roberts, 1999). Top management support is necessary to sustain likely alteration, by having the ability to inform members of the company about the novel know-how (Low et al., 2011; Thong, 1999). In summary, top management support has an effect on IT/IS innovation acceptance (Daylami et al., 2005; Thong, 1999).
- ***Innovativeness*** is the extent of which a user accepts the innovation earlier than other members of the same social level (Rogers & Shoemaker, 1971). According to Lin and Jeffres (1998), innovativeness is a vital part of IS innovation adoption and distribution. The receptivity of a firm to new ideas is important in acceptance decision (Lin & Jeffres, 1998; Marcati et al., 2008), while longitudinally and innovativeness endorses constructive acceptance decisions (Damanpour, 1991).

This feature is connected with the character of the decision maker (Marcati et al., 2008). This feature has been scrutinised in earlier research (Midgley & Dowling, 1978).

- ***Prior technology experience*** is the level of a client's experience and knowledge of previous similar technologies (Heide & Weiss, 1995; Lippert & Forman, 2005). Many studies have held this feature vital in innovation adoption (Dholakia & Kshetri, 2004; Igbaria et al., 1995). The customer's experience with earlier comparable know-how is anticipated to take part in the acceptance decision. Customers' adoption activities could be impacted by the accrued knowledge in utilising new innovations (Rogers, 2003).
- ***Technology readiness*** is availability of technical infrastructure and a workforce's preparedness to back new IT/IS innovation (Oliveira & Martin, 2010). IT personnel offer expertise and information to execute new technology infrastructure. Organisations with technical infrastructure are better equipped to accept the new technology (Low et al., 2011).

3. Environmental context

Environmental context is comprised of the availability and price of bandwidth, pressures exerted by competitors and partners, market scope and industry as well as external computing support and supplier efforts (Tornatzky & Fleischer, 1990).

- ***Bandwidth availability and price*** describes the situation whereby adopting any new IT/IS innovation needs Internet access and bandwidth (Armbrust et al., 2010). High bandwidth is vital for quick data recovery (Castells, 1996). The problem in emerging nations is the shortage of bandwidth and dependable broadband connectivity (Tweneboah-Koduah, 2012).
- ***Competitive and trading partner pressure*** is the extent of stress felt by firms in the industry (Oliveira & Martin, 2010). Competition within organisations and industry is a setback for acceptance of innovations (Chong et al., 2009; Jianyuan & Zhaofang, 2009; Low et al., 2011; Oliveira & Martin, 2010). Trading partner pressure is further considered as a deterrent by many researchers (Jianyuan & Zhaofang, 2009; Oliveira & Martin, 2010).
- ***Industry*** describes how the category of the business could impact on its capability to accept new IT/IS innovation (Goode & Stevens, 2000; Jeyaraj et al., 2006). As

organisations in various sectors contain diverse requirements some sectors may accept it while others might refrain from it (Yap, 1990).

- ***Market scope*** describes the horizontal degree of a firm's functions (Zhu, 2003), and shows the organisation's product-market field (Pflugheoft et al., 2003). Small and medium size organisations function locally, nationally and globally (Wilson, 2011). For this small and medium size organisations need an effectual communication network (Wilson, 2011). The IT/IS study recommends that the bigger the business range, the higher the need for IT (Dewan et al., 1998; Hitt, 1999). Some researchers pointed out that organisation's that have an international presence are inspired to use e-business (Zhu et al., 2006a). Businesses with a wide scope of activities have greater tendency to have a complex network of connections with external suppliers and clients. While small and medium sized organisations, which accept new IT/IS innovation capabilities, are expected to minimise external costs, making them less dependent onsite.
- ***External computing support*** is the existence of support to deploy and use IT/IS (Frambach et al., 1998; Premkumar & Roberts, 1999). Firms might undertake implementation of novel know-how if they have adequate support (Premkumar & Roberts, 1999). Promotional actions that dealers implement could considerably impact upon the acceptance resolutions of small and medium sized organisations. Earlier studies have endeavoured to illustrate an association between dealer advertising attempts and the customer's acceptance resolution (Frambach et al., 1998; Hultink et al., 1997). Alternatively, some studies report the insignificance of this feature (DeLone, 1988; Raymond, 1985). However, some researchers emphasise the significance of objectives and communication to decrease the professed threat from probable clients (Frambach & Schillewaert, 2002).

As discussed earlier, the TOE system clarifies the adoption of technology through three components: technological, organisational, and environmental contexts. The TOE framework compared with other adoption and diffusion hypotheses is a substantially more significant diagnostic instrument to order all determinants of new IT/IS innovation adoption in technological, organisational, and environmental contexts. The TOE framework is an advantageous technical device for illustrating the adoption of innovation by firms (DePietro et al., 1990).

- ***Empirical studies of the organisation level theories***

This research investigates the organisation level theories and proposes an extensive account of studies that draw on these theories. The TOE framework has been utilised by several researchers in the IT/IS field to analyse the methodology of adopting novel technologies. In several studies used the TOE framework to understand different IT/IS adoptions such as: open systems (Chau & Tam, 1997); EDI (Kuan & Chau, 2001); web site (Oliveira & Martin,s 2008); e-commerce (Martins & Oliveira, 2009); enterprise resource planning (ERP) (Pan & Jang, 2008); business to business (B2B) e-commerce (Teo et al., 2006); e-business (Lin & Lin, 2008; Oliveira & Martins, 2010; Zhu, 2003; Zhu & Kraemer, 2005; Zhu et al., 2006a); and CC (Alshamaila et al., 2012; Low et al., 2011).

Rogers' DOI has been broadly employed by researchers from diverse fields. Most of the studies try to either affirm the validity of the model or they employ the constructs to examine the diffusion of an innovation. Several studies used only the DOI theory to understand different IT adoptions such as: material requirements planning (MRP) (Cooper & Zmud, 1990); IS adoption (Thong, 1999); Internet (Eder & Igbaria, 2001); web-site (Beatty et al., 2001); and ERP (Bradford & Florin, 2003).

Institutional theory has been utilised by several researchers in the IT/IS field to analyse the methodology of adopting novel technologies. In several studies used the Institutional theory to understand different IT/IS adoptions such as: corporate social and environmental disclosure (CSED) (Ali & Rizwan, 2013).

Table 2.3 illustrates and summarises the main significant example of TOE; DOI; and Institutional Theory-based studies, and outlines the main analysed variables. This is followed by the data collection methods and the data analysis methods that each study used, along with the main findings of each study.

Table 2.3: Empirical studies of the organisation level theories

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
Open Systems Chau & Tam (1997)	**TOE**	• Characteristics of the "Open Systems Technology" Innovation: Perceived benefits; perceived barriers; perceived importance of compliance to standards, interoperability and interconnectivity • Organisational technology: Complexity of IT infrastructure; satisfaction with existing systems; formalisation of system development and management • External environment: Market uncertainly	T-test, FA, logistic regression	Face-to-face interview, 89 firms Hong Kong	Firms have a tendency to be more concerned about their capability to adopt instead of the profits they achieve by adopting. Adopter firms perceive higher government influence but lower industry influence than non-adopter firms.
EDI Kuan & Chau (2001)	**TOE**	• Technological context: Perceived direct benefits; perceived indirect benefits • Organisational context: Perceived financial cost; perceived technical competence • Environmental context: Perceived industry pressure; perceived government pressure	FA, and Logistic regression	Letter with questionnaires was sent; 575 small firms Hong Kong	Direct benefits are perceived to be higher by adopter firms than by non-adopter firms; adopter firms perceive lower financial costs and higher technical competence than non-adopter firms.
E-Business Zhu (2003)	**TOE**	• Technology competence: IT infrastructure; e-business know-how • Organisational context: Firm scope, firm size • Environmental context: Consumer readiness; competitive pressure; lack of trading partner readiness • Controls: Industry and country effect.	Confirmatory factor analysis, second-order factor modelling, logistic regression, and cluster analysis (CA)	Telephone interview during 2000; 3552 firms European (Germany, UK, Denmark, Ireland, France, Spain, Italy, and Finland)	Technology competence, firm scope and size, consumer readiness, and competitive pressure are essential adoption drivers, while absence of trading partner readiness is a noteworthy adoption inhibitor.
E-Business Zhu & Kraemer (2005)	**TOE**	• Technological context: Technology competence • Organisational context: Size; international scope; financial commitment	CFA, second-order factor modelling, and SEM	Telephone interview during 2002, 624 firms across 10 developed and	Firm size, financial commitment, technology competence, competitive pressure, and regulatory support are significant factors of e-business adoption.

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
		• Environmental context: Competitive pressure; regulatory support • E-business functionalities: Front-end functionality; back-end integration.		developing countries	
Deployment of B2B e-commerce: B2B firms versus non-B2B firms Teo et al. (2006)	**TOE**	• Technological inhibitors: Unresolved technical issues; lack of IT expertise and infrastructure; lack of interoperability • Organisational inhibitors: Difficulties in organisational change; problems in project management; lack of top management support; lack of e-commerce strategy; difficulties in cost-benefit assessment • Environmental inhibitors: Unresolved legal issues; fear and uncertainty.	FA, t-tests and discrimination analysis	249 firms North America and Canada	The key inhibitors in B2B deployment are the lack of top administration support, unsolved technical issues, the lack of e-commerce strategy, and the difficulties in cost-benefit assessment of e-commerce investments.
Web Site Oliveira & Martins (2008)	**TOE**	• Technological context: Technology readiness; technology integration; security applications • Organisational context: Perceived benefits of electronic correspondence; IT training programmes; access to the IT system of the firm; Internet and e-mail norms • Environmental context: Web site competitive pressure • Controls: Services sector.	Multiple Correspondence Analysis (MCA)	3155 small and 637 large firms Portuguese	The results identify seven relevant drivers of web site adoption for small firms: technology readiness, technology integration, internal security application, perceived benefits of electronic correspondence, IT training programs, internet and e-mail norms, and web site competitive pressure. For large firms, the results identify four significant factors influencing web site adoption decision: technology readiness, IT training programs, access to the IT system of firms and web site competitive pressure. In both cases, as expected, the economic sector is a relevant factor.
E-Commerce Liu (2008)	**TOE**	• Technological: Support from technology; human capital; potential support from technology • Organisational: Management level for information; firm size	FA	E-mail survey, online survey and telephone interview 156 firms	Technology foundation, user satisfaction, management, EC security, and potential technology investment have a tendency to have the most noteworthy effect on EC development. Firm size appeared to be a non-

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
		• Environmental: User satisfaction; e-commerce security • Controls: Firm property.		China	critical aspect, while firm property was discovered not to influence EC development.
ERP Pan & Jang (2008)	**TOE**	• Technological context: IT infrastructure; technology readiness • Organisational context: Size; perceived barriers • Environmental context: Production and operations improvement; enhancement of products and services; competitive pressure; regulatory policy.	FA, and Logistic regression	Face-to-Face interview 99 firms Taiwan	Technology readiness, size, perceived barriers and production and operations improvements are significant determinants of the adoption of ERP.
Internal Integration of E-Business **External Diffusion of E-Business** Lin & Lin (2008)	**TOE**	• Technological context: IS infrastructure; IS expertise • Organisational context: Organisational compatibility; expected benefits of e-business • Environmental context: Competitive pressure; trading partner readiness.	CFA, and SEM	E-mail survey 163 large firms Taiwan	IS infrastructure, IS expertise, expected benefits of e-business, and competitive pressure are factors, which positively impact the diffusion of e-business.
Web Site **E-commerce** Martins & Oliveira (2009)	**TOE**	• Technological context: Technology readiness; technology integration; security applications • Organisational context: Perceived benefits of electronic correspondence; IT training programmes; access to the IT system of the firm; internet and e-mail norms • Environmental context: Web site competitive pressure; e-commerce competitive pressure • Controls: Services sector.	MCA	2626 firms Portuguese	Technological capacities, IT skills, outsourcing partner usage, perceived obstacles, size and the quality of human resources played an important role in the intra firm IT diffusion process. The results indicate that larger firms are more likely to be enhanced users, probably due to greater resources and economies of scale.
E-Business Oliveira & Martins (2010)	**TOE**	• Technological context: Technology readiness; technology integration; security applications • Organisational context: Perceived benefits of electronic correspondence; IT training programmes; access to the IT system of the firm; internet and e-mail norms	T-test, FA, and CA	Telephone interview 6964 firms across 27 countries	The perceived benefits and barriers of e-business, technology readiness, competitive pressure, and trading partner collaboration positively impact the adoption decisions.

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
		• Environmental context: Web site competitive pressure • Controls: Services sector.			
Cloud Computing Low et al. (2011)	**TOE**	• Technological context: Relative advantage; complexity; compatibility • Organisational context: Top management support; firm size; technology readiness • Environmental context: Competitive pressure; trading partner pressure.	logistic regression technique	Survey 111 firms belonging to the high-tech industry in Taiwan	Relative advantage, top management support, organisation size, competitive pressure, and trading partner pressure characteristics have a significant effect on the adoption of CC.
Cloud Computing Alshamaila et al. (2012)	**TOE**	• Technological context: Relative advantage; uncertainty; compatibility; complexity; trial-ability • Organisational context: Size; Top management support; Innovativeness; Prior IT experience • Environmental context: Competitive pressure; Industry; Market scope; Supplier efforts and external computing support.	Data reduction; data display and conclusion drawing/verifica tion	Semi-structure interviews 15 SMEs North east of England	The main factors that were identified as playing a significant role in SME adoption of cloud services were: relative advantage, uncertainty, geo-restriction, compatibility, trial-ability, size, top management support, prior experience, innovativeness, industry, market scope, supplier efforts and external computing support.
MRP Cooper & Zmud (1990)	**DOI**	• Management tasks on IT • Technology on adoption and infusion of technology.	##########	Survey and telephone interview	The results focus on the significance of accurately positioning managerial rationality. This aspect is extremely vital in clarifying the diffusion of innovation, but not that informative in depicting the infusion of the innovation. They found that political interests impact the decision to adopt innovations.
IS Adoption Thong (1999)	**DOI**	• Decision makers' characteristics • IS characteristics • Organisational characteristics.	Discriminant analysis	Survey 166 small firms	Decision maker's innovativeness and IS knowledge, innovations' relative advantage, compatibility and complexity, business size and workers' IS knowledge have a positive influence on IS adoption. On the other hand, the degree of IS adoption is basically determined by organisational characteristics. The author discovered environmental

IT Adoption	Theory	Analysed variables	Methods	Data and context	Main findings
					characteristics not to be significant in the adoption of IS by small industries.
Internet Eder & Igbaria (2001)	**DOI**	• Top management support • Organisation structure • Organisation size • IT infrastructure • IS structure.	Principal component analysis	Survey 1000 firms US	Intranet diffusion is connected with earliness of adoption. Top management support and IT infrastructure flexibility are definitely linked with intranet infusion; this alliance is interceded by intranet diffusion.
Web site Beatty et al. (2001)	**DOI**	• Perceived benefits • Organisational compatibility • Technical compatibility • Top management support • Complexity.	MANOVA	Survey 286 medium & large firms US	The factors that had a remarkable influence on the early adopters are perceived benefits and compatibility with existing technology and organisational norms. There were no important discoveries for later adopters. They discovered that benefits and compatibility as influential aspects in adoption and persistent use.
ERP Bradford & Florin (2003)	**DOI**	• Innovative characteristics • Organisational characteristics.	Linear regression	Survey 51 managers	Top management support and training are positively associated to consumer satisfaction. Competitive pressure adversely impacts consumer satisfaction, it is positively linked to perceived organisational performance. Another factor that is positively related with perceived organisational performance is consensus in organisational objectives.
Corporate Social and Environmental Disclosure (CSED) Ali and Rizwan (2013)	**Institutional theory**	• Coercive Stakeholder/Institutions: government; media; employees; investors/financial institutions; international buyers; trade unions and customer associations • Mimetic Stakeholder/Institutions: multinational companies; Industry standards and competitors • Normative Stakeholder/Institutions: company characteristics; CSR frameworks; NGOs; CSR labels and standard setting institutions; academic institutions.	###########	Case study of Soccer Ball industry of Pakistan and case study of Textile industry of Bangladesh	The researcher argued here that companies are exposed to different institutions at the same time and these institutions can exert normative, coercive pressure, and mimetic pressure on the firm to adopt particular practice in the institutional context. More the intensity of institutional pressure, the more quickly the particular practice (i.e. CSED) will be adopted by the firm to look similar to other firms operating in the institutional environment.

2.5 Past Studies on Cloud Adoption in the Public Sector

CC adoption is an inventive method for organising technology (Marston et al., 2011) and is a broadly-examined issue (Wu et al., 2011). The aim behind this part of the study is to furnish an outline around earlier research of CC. There are a number of studies attempting to provide the best understanding of the significance of CC. These studies mostly attempt to enhance the reader's comprehension and knowledge about CC (Grossman, 2009; Youseff et al., 2008). Some different analysts expect to study the idea of CC by contemplating only one kind of CC, such as IaaS (Howell-Barder et al., 2013; Kim, 2011; Repschlaeger et al., 2012). Other research focused on one particular framework, such as ERP, which is offered by cloud suppliers (Saeed et al., 2011), e-learning applications (Doelitzscher et al., 2011) and Virtual Computing Lab (VLC) (Behrand et al., 2010). While some studies concentrate on CC application in diverse fields of study, such as computerised scientific examinations (Biggs & Vidalis, 2009) and science (Talukder et al., 2010).

Several researchers attempted to study the risks of utilising CC. They primarily attempted to recognise the challenges identified with utilising CC (Dillon et al., 2010; Jensen et al., 2009; Katsaros et al., 2009; Khorshed et al., 2012; Subashini & Kavitha, 2011; Zhang et al., 2010). Others directed the research towards the profits of CC adoption, primarily attempting to distinguish the foreseen profits identified with CC utilisation (Sperling, 2010).

The increased level of obstacles in the adoption of CC, specifically related to privacy, efficiency at the cost of resilience and environmental sustainability, due to the dependence of leading cloud vendors as Amazon, Google and Microsoft, has resulted in studies proposing several structures. As formerly indicated in the section related to anticipated benefits and challenges; transparency, responsiveness and responsibility in government activities requires the successful deployment of e-governance. In order to achieve the effective deployment of the e-governance structure, the positive participation of the public is an utmost requirement which will also support in government organisations being able to reach the optimum level of satisfaction among the users. A variety of previous studies have been rigorously collected, examined as well as analysed by researchers for the purpose of proposing a framework which best fits the requirements of government organisations.

A study carried out by Marinos and Briscoe (2009) recommended a substitute model for the conceptualisation of cloud, proposing a model for community based clouds, using networked computers where they are independent from the integrated vendor model. An alternative design model is offered by Community Cloud Computing (C3) which is created by integrating the cloud with concepts from grid computing, sustainability from green computing and standards from digital ecosystems, whilst maintaining the unique vision of the internet at the same time.

A separate study was conducted by Zwattendorferet al. (2013) which analysed the usage of CC for e-government services in eight countries within the European region. The study revealed that the dominate model of deployment in the respective countries was named as the Government Cloud (G-Cloud), which is a private or community cloud specifically developed for use by the national government. Also, there was no indication of a prominently preferred service model, where all generic cloud service models (IaaS; PaaS; SaaS) were used by most countries. Moreover, it was revealed that CC was incorporated into the national ICT strategies by over half of the considered countries.

By considering the weaknesses and short comings of the existing frameworks through a comprehensive study, a successful CC concept was proposed by Mukherjee and Sahoo (2010). This was followed by the development of a separate cloud structure for local governments in China by Liang and Jin (2013). This separate cloud structure was developed with the aim of resolving issues related to inefficiencies in the initial planning stages and the lack of integrated standards, for example, information isolation, challenges in departmental partnerships and failure to meet public requirements.

A study conducted by Stefanou and Skouras (2012) is mainly aimed at addressing the requirements of the expansion of e-government in Greece, in relation to labour and social security legislation problems. Stefanou and Skouras (2012), particularly proposed provisioning e-governance by the public Payroll Information System (PIS) through CC. The study included a questionnaire which was aimed at identification of positive perspectives of the organisations on using CC applications. In order to try and recognise which of the above mentioned hypotheses may support in making controls more effective and efficient, the Delphi technique was used. It was revealed that a group of experts representing the ministry of labour proposed that the stipulation through CC by the public sector of PIS may support the struggle against undeclared activities. The results depicted that e-governance is capable of retrieving detailed and trustworthy information to create statistical reports which supports the government strategies related to labour challenges.

A study by Huang and Gu (2013) proposed that CC can be effectively applied to the sections of government information sharing and distribution, due to the improved computing abilities, cost effectiveness and improved security. With respect to theory, practice and technology, it is scientifically possible to develop a cloud based information sharing platform for governments and some areas are already implementing this concept. By considering the existing problems related to governments and the design of the cloud government structure, new possibilities become open to investigation in regards to the development of CC usage in regional governments. With the steady introduction of CC concepts in e-governance, the standard of information can be highly improved where all-in-one e-government structures based on the cloud platform can provide more benefits and convenience to an increased number of people.

2.6 Research Gaps

The following are the research gaps addressed by this research:

- Research about the use of CC in the public sector in general is limited. There were only limited theoretical studies that dealt with CC adoption and the majority of the studies were limited to government newsletters and policy statements, which lack proper methodology and evidence.
- To the author’s knowledge, there are no studies that have been conducted to assess the adoption of CC with reference to Australia, in particular Queensland regional municipal governments.
- The paucity of empirical studies about the factors that influence the adoption of CC in ARMGs has hindered understanding and thus the development of strategies to improve its adoption.
- There is a lack of exploratory studies that provide an in-depth and holistic investigation of all the actual factors that influence the adoption of CC in ARMGs.

- It also requires salient aspects of the transformation process to modernise the operation and functioning of ARMGs regarding public service delivery.

There is a lack of empirical studies in general on CC adoption, and more specifically, within the Australian scenario. There are some researchers who have concentrated on Australian CC adoption strategy for e-government, which aids the understanding of the process of implementation (Veljanovska & Zdravevska, 2013). Similar studies were also conducted by Liang et al. (2011) and Lee and Kim (2013). E-government applications necessitate more safe and responsive validation and identification techniques. Although the majority of the conventional government services hold on to stronger validation and identification mechanisms, the advanced cloud systems, however, lack the implementation of such mechanisms. There are prime challenges and issues that emerge while implementing CC in the public sector including; data protection and compliance, interoperability and flexibility of the data, data security identity and access management and analyzing and reviewing (Hashemi et al., 2013; Chen & Zhao, 2012; Kaufman, 2009; Verma & Kaushal, 2011; Pearson, 2009). These barriers and limitations hinder the scope of the ruling authorities' activity for the effective implementation of cutting-edge technologies.

The Australian government has emphasised the need for further studies on the benefits and challenges faced by government employees in relation to CC adoption. Furthermore it is believed that the results of such studies would support the existing Australian implementation policies and strategies and further enhance the rate of CC adoption in Australia. In the year 2013, the Australian Network and Information Security Agency (ANISA) implemented CC on their existing and upcoming research trends analyses. The Australian Commission has unambiguously referred to the CC system in their digital agenda for future decades (Kertesz, 2014). Most of CC services conducted are from the perspective of the developed countries (Yadav & Singh, 2012). There is a significant number of research articles that are review papers (Hashemi et al., 2013) and purely focus on the need for such technologies, by quoting its advantages and benefits and only few are empirical studies conducted using primary data. A study which investigated the data independence, with respect to government cloud services and the evolution of national and international policies was conducted by Irion (2011). Another study conducted by Cellary and Strykowski (2009) indicates that there is a sociological impact by which CC enables the swift availability of advanced IT facilities to the public agencies, offices and departments, irrespective of the location or the level of technical sophistication. The cloud based government model represents new opportunities for exploring the development of cloud based e-governance (Huang & Gu, 2013) and the progress in e-government based technologies and services is swiftly experienced all over the world (Chandra & Bhadoria, 2012).

2.7 Summary

This research aims to provide a significant contribution to the emerging literature through an original investigation, analysis and testing of ideas, as well as the formulation of strategic programs or models regarding CC adoption in ARMGs. It also requires salient aspects of the transformation process to modernise the operation and functioning of local government councils regarding public service delivery. This research attempts to address the gaps in CC adoption and further investigates the Queensland regional municipal government sectors to identify and develop an increased understanding of factors impacting CC adoption.

This chapter has reviewed the relevant literature to explore the emerging field of CC and bring focus on four related areas for research development in general, (1) technology concepts; (2) CC technology and its characteristics; (3) technology innovation adoption theories; (4) past studies on the adoption of CC. The following chapter outlines the research model design employed in this research in an attempt to fill the identified gaps within past studies.

3 CHAPTER THREE:-

RESEARCH MODEL DESIGN

3.1 Overview

The preceding chapter presented the state-of-the-art research surrounding CC and its characteristics. The review also discussed technology innovation adoption theories and discussed past studies on the adoption of CC in the public sector. This research aims to explore the value creation from CC in ARMGs. This chapter builds upon the theoretical foundations that were discussed in the preceding chapters for structuring the conceptual framework and associated hypotheses, which were dependent upon the literature. These foundations will provide support in establishing a theoretical basis for evaluating factors that influence the intention to adopt CC in ARMGs. Furthermore, this chapter highlights the research design, with respect to research questions and the experiential and theoretical studies of the aspects which can be comprised within the conceptual framework and the chapter then ultimately denotes the research hypothesis.

3.1.1 Research Questions

This research aims to explore potential for value creation from CC in ARMGs by identifying factors that are likely to influence the adoption of CC, including factors to be considered for CC adoption, current level of policy, anticipated benefit, and challenges and issues. The Research Question (RQ) and Research Sub-Questions (RSQ) are:

What are the key factors that are perceived to influence the adoption of cloud computing in Australian regional municipal governments?

RSQ1: *What are the factors that need to be considered in the adoption of CC in ARMGs?*

RSQ2: *What is the current level of policy for adoption of CC in ARMGs?*

RSQ3: *What are the significant anticipated benefits of CC in ARMGs?*

RSQ4: *What are the most important challenges and issues that influence the adoption of CC in ARMGs?*

RSQ5: *Is the research model efficient, valid and reliable to evaluate CC in ARMGs?*

3.2 Proposed Model of Conceptual Research

In order to investigate CC adoption by ARMGs, a conceptual model, derived from the literature and the qualitative phase of the research, is proposed. According to the proposed model, the categories of objectives for adopting CC include; compatibility (Rogers, 2003; Teo et al., 1997; Premkumar & Roberts, 1999; Premkumar, 2003; Daylami et al., 2005; Zhu et al., 2006b); complexity (Rogers, 2003; Beaubouef, 2011; Tiwana & Bush, 2007; Chaudhury & Bharati, 2008; Harindranath et al., 2008; Sahin, 2006); cost (Sultan, 2010; Saeed et al., 2011; Saini et al., 2011; LGAQ, 2013; Cervone, 2010); security concern (Paquette et al., 2010; Subashini & Kavitha, 2011; Carroll et al., 2011; Chebrolu, 2011); top management support (Premkumar & Michael, 1995; Eder & Igbaria, 2001; Daylami et al., 2005; Thong, 1999; Wilson et al., 2008; Jeyaraj et al., 2006); organisation size (Mahler & Rogers, 1999; Kamal, 2006; Rogers, 2003; Jeyaraj et al., 2006; Lee and Xia, 2006); employee's knowledge (Thong, 1999; Bandura, 1977; Igbaria et al., 1995; Kuan & Chau, 2001; Lippert & Forman, 2005); government regulation (Kim et al., 2009; Marston et al., 2011; Motta et al., 2012); information intensity (Thong, 1999; Porter & Millar, 1985; Yap, 1990); and anticipated benefit (Beatty et al., 2001; Kuan & Chau, 2001; Gibbs & Kraemer, 2004; Daniel & Grimshaw, 2002).

Figure 3.1 illustrates the constructs that are believed to influence the intention to adopt CC.

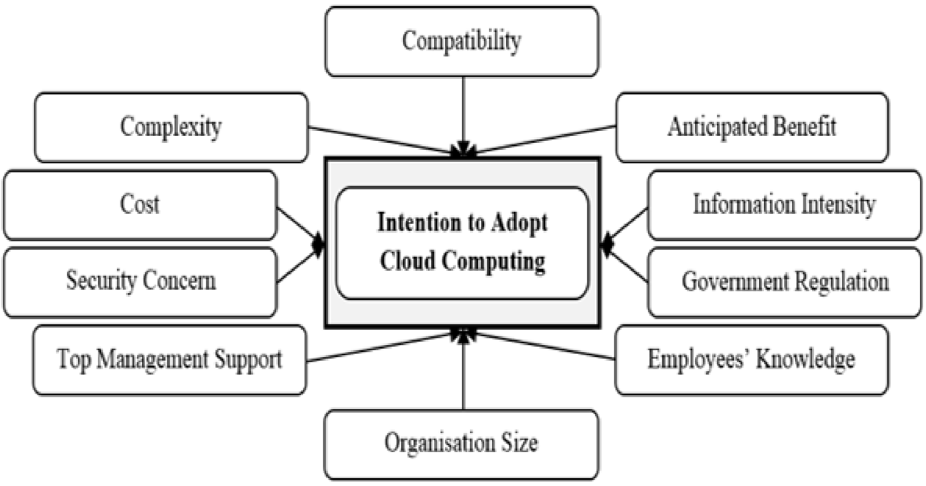


Figure 3.1: Research conceptual model

A theoretical framework was developed based on the TOE framework (Tornatzky & Fleischer, 1990) and DOI theory (Rogers, 1995) including: technology factors which refer to (cost and security); organisational factors which refer to (size of organisation; top management support and employee's knowledge); and environment factors which refer to (regulation support and information intensity) (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011; Melville & Ramirez, 2008; Low et al., 2011). These factors were combined with only one factor of the DOI theory, being; innovation characteristics which refer to (compatibility and complexity) (Rogers, 1995). The three factors of TOE framework and the one factor of DOI theory, were also combined with benefits characteristics (Aljabre, 2012; Marston et al., 2011; Kim et al., 2009; Heinle & Strebel, 2010).

Most of the past studies have only recognised the technological determinants of CC adoption (Low et al., 2011). Due to the influence of socio-technical factors in cloud-based administrations and innovations, organisational and environmental factors are similarly as critical as technological factors (Feuerlicht, 2010). Accordingly, this combining of models is justified as it provides improved understanding of the IT/IS adoption phenomenon (Chong et al., 2009; Wang et al., 2010; Zhu et al., 2006b). Furthermore, the combination of models is justified for two reasons; the first being that the TOE framework includes a focus on the environmental context of technology adoption, which is not included in the DOI theory, and that TOE is better able to explain intra-firm innovation adoption (Oliveira & Martins, 2011). The second reason is that the empirical support and theoretical basis are the main advantages of the TOE framework and DOI theory. The study conducted by Rui (2007), notes that: "Compared to other theories, the TOE framework overcomes the domination of the technical perspective and provides a useful analytical tool". The author's review of previous studies found that, typically, studies on IT/IS adoption at the organisational level are derived from using TOE, and DOI (Oliveira & Martins, 2011; Rui, 2007).

Most studies that use theories of technology adoption at the organisational level utilise the TOE framework and DOI model (Oliveira & Martins, 2011; Lin & Lin, 2008). Some researchers analysed the adoption of technology based on the TOE framework (Lin & Lin, 2008; Martins & Oliveira, 2009; Teo et al., 2006; Zhu & Kraemer, 2005), others have chosen to study it through the DOI model (Bradford & Florin, 2003;

Cooper & Zmud, 1990; Eder & Igbaria, 2001; Yu-hui, 2008), although others have suggested studying the adoption of technology based on the two models together (Chong et al., 2009; Wang et al., 2010; Yu-hui, 2008; Thong, 1999). While TOE framework and DOI theory have been successfully applied individually to numerous studies about adoption of innovation at an organisational level; both models have also been successfully combined together within numerous studies about the adoption of innovation at an organisational level. However, this combined model has not been specifically applied to the adoption of CC.

The ten variables within this proposed research model are divided into five main categories. Figure 3.2 illustrates the variables categorised into five groups: innovation characteristics; technology context; organisational context; environmental context; and benefits characteristics. These groups are expected to impact the intention to adopt CC among ARMGs. These concepts are derived from the TOE framework and DOI theory. These factors are modified in order to suit the context of ARMGs.

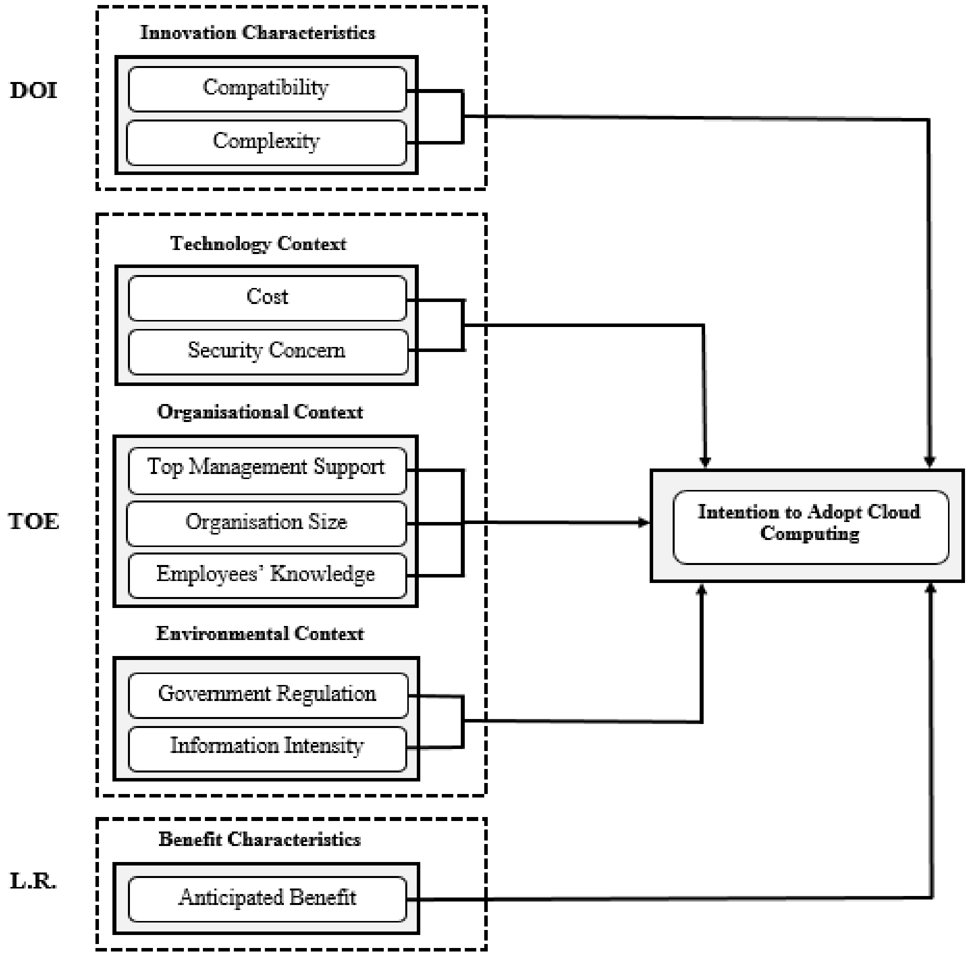


Figure 3.2: Research proposed model

Table 3.1 shows the original theory of each variable that was used in this research proposed model. In this table each variable is linked to a theoretical framework.

Table 3.1: Original theories and variables

Original Theory	Variable	Construct in original theory
DOI Theory	Compatibility	Innovation characteristics
	Complexity	
TOE Framework	Cost	Technological context
	Security concern	
	Organisation size	Organisational context
	Top management support	
	Employee's knowledge	
	Government Regulation	Environmental context
	Information intensity	
Literature Review	Anticipated benefit	Benefit characteristics

3.2.1 Empirical Studies that Combined TOE Framework with DOI Theory

For the adoption of new technology within the increasingly complex field of IS/IT, it is essential to unify several theories rather than having a single theory to build the theoretical research model on, for obtaining an enhanced level of understanding of the trend of IS/IT adoption. The TOE framework and DOI theory are extensively utilised to investigate the technology adoption at the organisational level (Lin & Lin, 2008; Oliveira & Martins, 2011). This part summarises the most significant studies that used the TOE framework combined with DOI theory. The following are the studies that employed the TOE framework combined with the DOI model to adopt different IS technologies; EDI (Thong, 1999); e-business (Zhu et al., 2006a); collaboration commerce (Chong et al., 2009); Radio Frequency Identification technology (RFID) (Wang et al., 2010).

Table 3.2 illustrates and summarises the main significant examples of the TOE framework combined with DOI theory based studies and outlines the main analysed variables for each study. This is followed by the data collection methods and the data analysis methods that each study used and the main findings of each study.

Table 3.2: Studies combined TOE framework with DOI theory

IT Adoption	Theory Model	Analysed variables	Methods	Data and context	Main findings
Used one major software application Thong (1999)	**TOE & DOI**	• CEO characteristics: CEO's innovativeness; CEO's IS knowledge • IS characteristics: Relative advantage of IS; compatibility of IS; complexity of IS • Organisational characteristics: Business size; Employees' IS knowledge; information intensity • Environmental characteristic: Competition.	T-tests, FA, discriminatory analysis, and PLS	Letter with questionnaires sent during 2005, 166 small firms; Singapore	Innovativeness, IS knowledge level, relative advantage, compatibility, complexity, business size and level of employee's IS knowledge positively impact the decision to adopt e-business.
E-Business Usage E-Business Impact Zhu et al. (2006a)	**TOE & DOI**	• Technological context: Technology competence • Organisational context: Organisation size • Environmental context: Competitive pressure; partner readiness.	CFA, second-order factor modelling, and SEM	Telephone interview during 2002; 1415 firms across six European countries	Compatibility is the strongest driver, and consumers are more worried about security than cost. Competence, partner readiness and competitive pressure considerably impact e-business usage.
Collaborative Commerce Chong et al. (2009)	**TOE & DOI**	• Innovation attributes: Relative advantage; compatibility; complexity • Environmental: Expectations of market trends; competitive pressure • Information sharing culture: Trust; information distribution; information interpretation • Organisational readiness: Top management support; feasibility; project champion characteristics	FA	E-mail survey: 109 firms Malaysian	External environment, organization readiness and information sharing culture considerably impact the decision to adopt collaborative commerce.

IT Adoption	Theory Model	Analysed variables	Methods	Data and context	Main findings
RFID Wang et al. (2010)	**TOE & DOI**	• Technology: Relative advantage; complexity; compatibility • Organisation: Top management support; firm size; technology competence • Environment: Competitive pressure; trading partner pressure; information intensity.	FA and logistic regression	E-mail survey 133 firms Taiwan manufacturing firms	Information intensity, complexity, compatibility, firm size, competitive pressure, and trading partner pressure are aspects that considerably impact the adoption of RFID by manufacturing companies.

3.3 Definition of Research Proposed Model Variables

This section provides the definition of the research proposed model variables.

- **Innovations characteristics**

In considering the adoption of CC, two variables were proposed in the context of the characteristics of innovation: compatibility and complexity.

Compatibility is: 'the degree to which innovation fits the potential adopter's existing values, previous practices and current needs' (Rogers, 2003). An extensive amount of research publications exist which focus on detailing the role of compatibility, where it is deemed as a vital determinant of IT innovation adoption (Rogers, 2003; Teo et al., 1997; Premkumar & Roberts, 1999; Premkumar, 2003; Ching & Ellis, 2004; Daylami et al., 2005; Zhu et al., 2006b).

Complexity is: "the degree to which an innovation is perceived to be relatively difficult to understand and use" (Rogers, 2003). Acceptance of a new technology by an organisation may result in challenges with respect to incurred process changes and how they cooperate with their business structures. For improving the rate of adoption, new technologies must have aspects such as user-friendliness and intuitiveness (Sahin, 2006).

- **Technological context**

Technology context refers to the technological factors such as cost and security concern that available in the organisation for the adoption of technology.

Cost refers to how a business can remain economically viable, feasible and imperishable, as hardware costs and associated administrative costs have to be properly interpreted (Forell et al., 2011; Li et al., 2009).

Security concern refers to the level of data and the system security within the organisation (Paquette et al., 2010; Subashini & Kavitha, 2011).

- **Organisational context**

The organisational context is identified in relation to the available resources for supporting the adoption of innovations (Lippert & Govindarajulu, 2006). For this research, top management support, organisation size and employee knowledge were considered as key organisational aspects.

Top management support is defined as the primary linkage between individual ICT innovation adoption and the organisational ICT innovation adoption. In general, top management support is vital for keeping the significance of potential changes by an uttered view for the organisation and through sending signals of the importance of the new technology to the other employees of the organisation (Thong, 1999; Low et al., 2011). It is assumed that the adoption of ICT innovation is highly influenced by top management (Thong, 1999; Daylami et al., 2005; Wilson et al., 2008).

Organisation size is explained as the size of the organisation including employees and resources. Rogers (2003) stated that, size is one of the most vital influencing factors of the innovator profile. For a long period of time, organisation size was the central focus of research aimed at IT innovation adoption and it is assumed to be an imperative forecaster of ICT innovation adoption (Jeyaraj et al., 2006; Lee & Xia, 2006).

Employee's knowledge can be defined as the similar experiences envisioned within a band that explains the level of connections between the present and practices and experiences of the past (Lippert & Forman, 2005).

- **Environmental context**

Environmental context includes government regulation and information intensity (Tornatzky & Fleischer, 1990).

Government regulation is explained as the support provided by the relevant authority for influencing the improvement of IS innovations in organisations (Jaeger, 2007; Jaeger et al., 2008). Kaufman (2009) stated that regulations imposed by the government are one of the vital environmental aspects that influence the adoption of new technologies.

Information intensity can be defined as the level to which information is available in the product or service of a business (Thong, 1999).

- **Benefit characteristics**

Benefit characteristics comprises the anticipated benefit from the adoption of new technology.

Anticipated benefit refers to the benefits that the organisation created with the adoption of the new technology (Aljabre, 2012; Kim et al., 2009; Marston et al., 2011; Heinle & Strebel, 2010). Empirical studies found that perceived benefits play an important role in the decision to adopt new technologies (Beatty et al., 2001; Kuan & Chau, 2001; Gibbs & Kraemer, 2004; Daniel & Grimshaw, 2002).

3.4 Research Hypotheses

By employing the measures that were defined in the previous section, ten hypotheses were developed and tested to analyse the proposed conceptual research model and provide answers to the research questions. For more details see Figure 3.3.

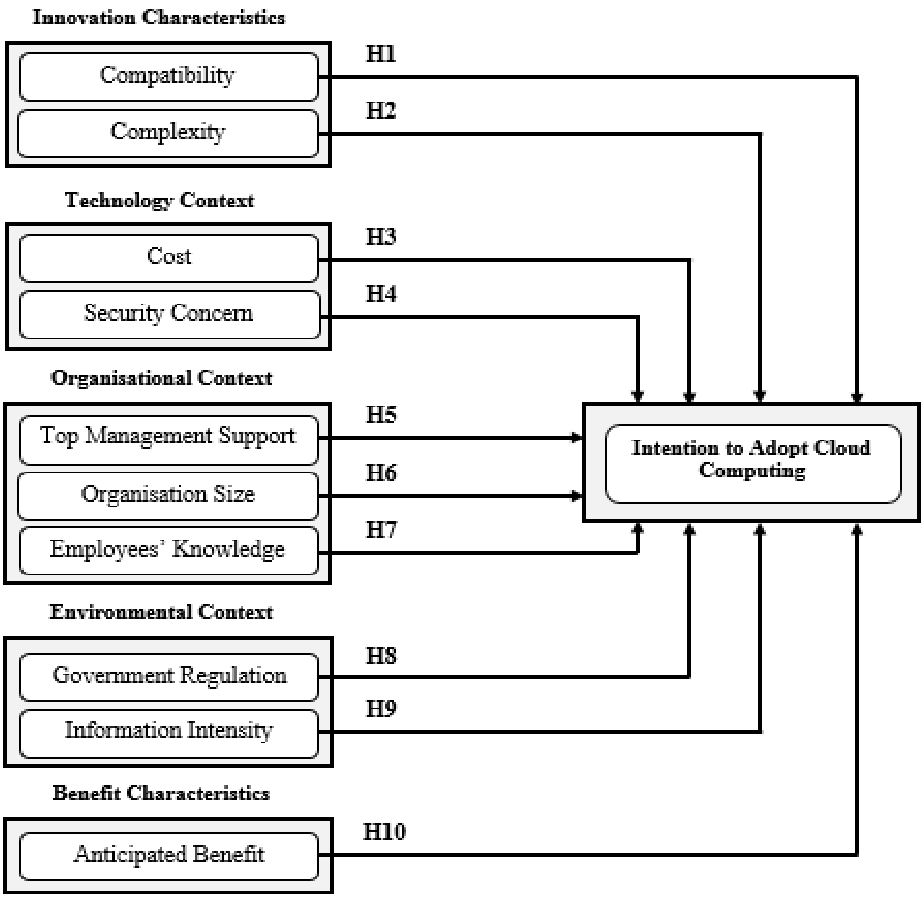


Figure 3.3: Research hypotheses

- **Hypothesis One (H1) (Compatibility)**

Compatibility is one of the factors that was adapted from the DOI theory. According to the literature, compatibility is one of the constructs which significantly influences the adoption rate of innovations (Rogers, 2003). Studies which investigated the diffusion process of innovations have found compatibility to be a significant determinant (Rogers, 2003; Teo et al., 1997; Premkumar & Roberts, 1999;

Premkumar, 2003; Ching & Ellis, 2004; Daylami et al., 2005; Zhu et al., 2006a). It is postulated that CC's compatibility with the work environment has a positive impact on the intention to adopt CC; the related hypothesis is:

> **H1 -** ***Increase the level of cloud computing's compatibility with organisational norms and technologies has a positive influence on the intention to adopt cloud computing.***

- **Hypothesis Two (H2) (Complexity)**

Complexity is the second factor that was adapted from the DOI theory in this research. The complexity of an innovation is considered an obstacle to the new technology adoption (Premkumar & King, 1994; Low et al., 2011). A technology which has the characteristics of difficulty in understanding and usage is considered to be complex. If it takes an extensively long time to be mastered or to perform general tasks by a user, that technology is said considered to be complex. Thus, for improving the rate of adoption, technologies must have the essential characteristic of user-friendliness (Sahin, 2006). Complexity is proved to be a key aspect in the decision for adoption (Tiwana & Bush, 2007; Chaudhury & Bharati, 2008; Harindranath et al., 2008). Thus, it is suggested that in terms of CC, there is a positive impact on the decision to adopt CC when the system has a low level of Complexity.

> **H2 -** ***The perceived low level of complexity of cloud computing has a positive impact on the intention to adopt cloud computing.***

- **Hypothesis Three (H3) (Cost)**

Cost savings is one of the primary capabilities of CC (Cervone, 2010). Cloud computing service providers' state that their services can considerably cut down the total IS cost of an organisation, including fixed costs, such as initial investment, variable costs such as, upgrading and maintenance as well as training costs (Zhu et al. 2006a). The minimal level of cost for obtaining the services improves the possibility of achieving CC adoption. In this context of CC, the subsequent hypothesis is constructed:

> **H3 -** ***Cloud computing is regarded as being less costly than other computing paradigms; thereby making it more likely to be adopted.***

- **Hypothesis Four (H4) (Security concern)**

In terms of CC, security is the level in which CC is considered as being more secure by comparison to other models of computing. CSPs state that they have the ability to safeguard organisations' data more strongly than the organisations themselves (Kaufman, 2009). Security, in this research, is defined as the security of services, data centres and media. This construct takes into account the privacy and confidentiality of the organisations data (Paquette et al., 2010; Subashini & Kavitha, 2011). Higher levels of security have a positive influence on the intention to adopt CC; therefore in the context of CC, the following hypothesis has been developed:

> **H4 -** ***Cloud computing is regarded as being secure, the more likely it is for users to adopt.***

- **Hypothesis Five (H5) (Top management support)**

Top management support can affect the adoption of new technology innovation (Premkumar & Michael, 1995; Eder & Igbaria, 2001; Daylami et al., 2005). Through a revision of the predictors and biases in IT, Jeyaraj et al. (2006) revealed that support by top management is perceived to be the key link between individual and organisational ICT innovation adoption. These results are in line with the findings by Lertwongsatien and Wongpinunwatana (2003), who revealed that organisations have a lesser tendency to adopt new technologies without the support of top management. In the context of the intention to adopt CC, the following hypothesis has been developed:

> **H5 -** ***Organisations with high top management support are more likely to adopt cloud computing.***

- **Hypothesis Six (H6) (Organisation size)**

One of the significant factors associated with IT innovation is the size of the organisation (Dholakia & Kshetri, 2004; Hong & Zhu, 2006). Some experiential research has pointed out that a positive correlation exists between size and adoption of new technology in an organisation (Pan & Jang, 2008; Zhu et al., 2004). It is proposed that organisations of smaller size are less positively predisposed with far less flexibility in relation to changing their path (Grover & Teng, 1992; Jambekar & Pelc, 2002). Others have repeatedly found that due to their greater litheness and capacity for taking risk, larger organisations are more inclined to adopt more innovations (Pan & Jang, 2008; Zhu et al., 2004). The apparent tactical importance of CC in innovative technological development is affected by the vital factor of the size of the organisation. Thus, subsequent hypotheses are suggested:

H6 - ***The size of an organization will be positively correlated with the intention to adopt cloud computing.***

- **Hypothesis Seven (H7) (Employee's knowledge)**

The identification of previous similar practices by the employee can be considered on a scale which explains the level of connection among previous experiences and the current practice (Lippert & Forman, 2005). An organisation that has employees with an extensive level of knowledge about innovation encounters less confrontations and issues against introducing and practicing new technologies. Practical experiences have been noted which supports the positive correlation between adopting IS and the level of employee IS knowledge (Igbaria et al., 1995; Kuan & Chau, 2001; Lippert & Forman, 2005; Thong, 1999). In the context of intention to adopt CC, the following hypothesis has been developed:

H7 - ***An increase in employees' knowledge about cloud computing is positively related to their intention to adopt cloud computing.***

- **Hypothesis Eight (H8) (Government regulation)**

Government guidelines can be explained as the support provided by the government for the purpose of encouraging the amplification of the organisations IS innovation capacity (Jaeger, 2007; Jaeger et al., 2008). The policy settings that organisations have as measure through their current laws and regulations can be evaluated during this procedure. By formulating rules for safeguarding businesses using CC technology, governments can promote the adoption of CC (Best et al., 2008; Jaegar, 2007; Carrico & Smalldon, 2004). The following hypothesis is related to this construct:

H8 - ***Creating rules and policies about cloud computing is positively related to the intention to adopt cloud computing.***

- **Hypothesis Nine (H9) (Information Intensity)**

Organisations in different sectors have different information intensity, for example financial organisations need to have access to the most current information. Information intensity is the organisation's reliance on accessing up-to-date, reliable, relevant and accurate information whenever they need it. It has been reported that organisations that use more advanced ICT technologies have more ability to access internal, external, and previously encountered information (Chau & Tam, 1997; Chong et al., 2009; Thong, 1999). It allows the quick retrieval of such information and facilitates information accessibility (Huber, 1990). Organisations whose business depends on up-to-date information are more likely to adopt CC. The following hypothesis is related to this construct:

> **H9 -** ***Organisations with high information intensity are more likely to adopt cloud computing.***

- **Hypothesis Ten (H10) (Anticipated Benefit)**

Relevant literature indicates that the potential profits from CC based models are perceived to be the main cause behind the organisation's appetite for adopting CC (LGAQ, 2013). Potential benefits can be outlined as: significantly lower initial costs (Saeed et al., 2011; Saini et al., 2011), improved standardisation of services (Beaubouef ,2011), improved scalability as well as accessibility, which allowed CC to be implemented across a number of sectors (Saeed et al., 2011; Liang et al., 2011). One other advantage of CC is that there is minimal requirement for provision of resources and maintenance after the implementation and that the implementing organisation can concentrate more on its core business activities (Liang et al., 2011). Based on that, the following hypothesis is developed:

> **H10 -** ***The benefits created by using cloud computing technology is positively related to the intention to adopt cloud computing.***

3.5 Summary

This chapter represented the research model design used for this research. Also, in this chapter, the research questions were highlighted, concepts/variables were described and the research hypotheses were constructed. The subsequent chapter highlights and provides details of the research methodology which will be used for collecting and analysing data, for the purpose of attempting to provide answers to the research problem discussed in this thesis.

4 CHAPTER FOUR:-

RESEARCH METHODOLOGY

4.1 Overview

The previous chapter developed the conceptual framework and related hypotheses based on the literature. It outlined the research design in terms of the research questions, and highlighted the theoretical and empirical studies of the factors that can be included within the conceptual framework and presented the hypotheses for the research. This chapter outlines the research methodology that was used to collect and analyse data to try to answer the research problem that this thesis addresses. This chapter is divided into four sections: the first section aims to explain the research philosophy; the second section discusses the selected research approach; the next section outlines the research design; and the final section details the research data collection stages and analysis methods.

4.2 Research Philosophy

The philosophy of research is related to the development and nature of the knowledge (Guba & Lincoln, 1994; Mkansi & Acheampong, 2012; Saunders et al., 2009). The aim of every researcher is to make a contribution to knowledge in their particular area by conducting a critical and systematic approach based on rational arguments (Crossan, 2003; Proctor, 1998). In-depth knowledge about research philosophy will guide researchers to choose the most appropriate methodology from a range of potential research methodologies. The research philosophy leads researchers to be more imaginative and investigative in their research work to create outcomes at the end (Easterby-Smith et al., 1991).

Research philosophies are adopted to guide in efforts to specify and support the research methods to be used in this research (Crossan, 2003). This discussion contains the nature of phenomenon subjected to study, the form of evidence which is required to be collected and evaluated for providing answers to the research problem, the method in such evidence is translated and how it supports in answering the research questions outlined (Crossan, 2003; Easterby-Smith et al., 1991).

4.3 Research Paradigm

A paradigm is a framework comprising the commonly-accepted understandings about a subject, a structure of what direction research should take and how it should be performed (Deshpande, 1983). A paradigm is a set of assumptions or opinions expressed by a group of scientists exploring and studying the world (Denzin & Lincoln, 2003; Deshpande, 1983; Rao & Perry, 2007). Paradigms consist of the three components of ontology, epistemology and methodology (Healy & Perry, 2000; Rao & Perry, 2007). Table 4.1 uses ontology, epistemology, and methodology to compares positivism, realism, critical theory, and constructivism paradigms. Each of these three components will be addressed in turn. This exploration is required because the mixed methods to this research used two paradigms of positivism and constructivism.

Table 4.1: Comparison of different approaches

Item	Positivism	Realism	Critical theory	Constructivism
Ontology	Naïve realism - real Reality that is apprehend-able	Critical realism – real Reality but only imperfectly and probabilistically apprehend-able	Historic realism – virtual reality shaped by social, political, cultural, economic, ethnic and gender values: crystallised over time	Relativism – local and specific constructed realities
Epistemology	Dualist objectivist: findings are true as seen through a ‘one way mirror;	Modified dualist objectivist: critical tradition community findings probably true seen through an ‘open window:	Transactional subjectivist: value mediated findings by a ‘transformative intellectual’	Transaction/ subjectivist created findings by a ‘passionate participant’
Methodology	Chiefly quantitative methods: verification of hypotheses, experimental, survey	Case study, action research, convergent interviewing	Action research	In-depth interview, participant observation
Causality	Cause-effect relations	Causal tendencies or generative mechanism	Relationship between variables within boundaries	Relationship between variables within boundaries
Sample size	Large	Small	Very small	Very small
Type of data gathered	Replicable, discrete elements, statistical	Information-rich, contextual, non-statistical	Sample specific, non-statistical	Sample specific, non-statistical
Type of data analysis	Objective, value free, statistical methods	Value-aware, triangulation	Grounded, mediated, value dependent	Value dependent, consensus, subject to revision

Sources: Deshpande (1983); Orlikowski & Barondi (1991); Perry et al. (1997)

4.3.1 Ontology

Ontology is the investigation of the status of being, becoming, continuation or reality including the primary types of being and their relationships (Guarino, 1998; Perry et al., 1999; Sale et al., 2002; Shah & Corley, 2006). It is the primary assumptions which are created on the original aspects of reality, which defines what exists (Parkhe, 1993). The structure and status of the reality and what can be recognised about it is referred to ontology (Guba & Lincoln, 1994; Healy & Perry, 2000; Rao & Perry, 2007). It is applicable into four paradigms: positivism, realism, critical theory, and constructivism (Guba & Lincoln, 1994; Perry et al., 1999). Each paradigm will be explored briefly next.

The ***positivism*** paradigm proposes that the behaviour or the nature of the reality can be captured through an objective examination of a theory or conceptual models. This model once developed can be generalised to the population (Gabriel, 1990; Guba & Lincoln, 1994; Healy & Perry, 2000).

The next paradigm ***realism*** sights reality as albeit imperfectly apprehend-able (Guba & Lincoln, 1994; Healy & Perry, 2000; Outhwaite, 1983; Perry et al., 1997). The important facts mentioned in realism besides the reality analysis are: (1) the world is supposed to be an independent; (2) the main responsibility of science is to seek for the real knowledge regarding the world. However, that knowledge can never be authentic; (3) the knowledge which is put forward should be critically analysed. The test of that knowledge should be conducted to evaluate the consistency of the knowledge as either a representative of the world or not (Hunt, 1991).

The ***critical theory*** paradigm suggests that nature of the reality is formed internally with the passage of time. This formation takes place inside an individual's mind and is affected by various factors including economic, social, political, gender, ethnic, and cultural. This process helps in the transformation of reality which contains a new mental and social form. This type of reality is the historical or virtual reality (Guba & Lincoln, 1994; Perry et al., 1997).

In turn, ***constructivists*** argue that the characteristics of the reality are anticipated in the form of inner multiple irrelevant of mental structures communally and experientially (Guba & Lincoln, 1994). All of these are primarily reliant on their structure and on the content on the individual persons and groups supporting the constructions (Guba & Lincoln, 1994; Healy & Perry, 2000). This nature of the reality may be altered as their constructors turn in to be more knowledgeable (Healy & Perry, 2000).

4.3.2 Epistemology

Epistemology enquires into the meaning of knowledge, how it can be obtained as well as the level to which knowledge is applicable to any given topic (Cousins, 2002; Krauss, 2005). Epistemology explains how a researcher can obtain knowledge about field of study (Krauss, 2005; Parkhe, 1993; Shah & Corley, 2006). The affiliation between the knower and what can be known is defined as epistemology (Guba & Lincoln, 1994; Perry et al., 1999). The epistemology of each paradigm varies somewhat as discussed next.

Positivism describes the connection between the researcher and reality as 'dualist and objectivist' (Guba & Lincoln, 1994; Healy & Perry, 2000). Positivism means that the researcher has the ability to conduct the research without being affected by what is being discovered in the area of the research. The outcome of the research is assumed to be a true representation of reality and it can be defined objectively (Healy & Perry, 2000; Hunt, 1991; Parkhe, 1993).

In the ***realism*** paradigm, the relationship between the reality of the research area and the researcher is a modified dualist and objectivist relationship (Perry et al., 1997). The research used objective methods of investigation to arrive at findings that make a contribution to better understanding reality but not capture actual reality. Whilst in the role of observer, the researcher may have a level of participation within the field of the research (Carson & Coviello, 1996; Godfrey & Hill, 1995; Healy & Perry, 2000).

In turn, ***critical theory*** proposes that the association between the reality and the researcher should be subjective. Guba & Lincoln (1994) pointed out that it is understood that the research objectives and the research are interactively connected with the researcher's principles which ultimately influence the inquiry. Also, it can be stated that knowledge is grounded in social and historical routines, while their assumptions are subjective; and the research outcomes are value-based (Anderson, 1986; Riege & Nair, 1996). In other words, the researcher has been defined as a 'transformative intellectual' (Guba & Lincoln, 1994, p. 112).

The ***constructive*** paradigm is subjective where the researcher and the research objectives are thought to be connected interactively such that the results are actually developed while the study proceeds (Stokes & Perry, 2007). This paradigm combines the division between ontology and epistemology similar to the way in which in critical theory, the researcher is turned into a 'passionate participant' (Guba & Lincoln, 1994, p. 112).

4.3.3 Justification of the Research Paradigm

There has been a motivation among researchers to close the gap flanked by the two extreme points by choosing quantitative or qualitative in the past few decades. A mixed method approach applies a combination of qualitative and quantitative techniques in research (Easterby-Smith et al., 1991; Mangan, 2004). One of the key benefits of utilising mixed methods is its potential to resolve issues related to possible bias or the infertility of single method approaches (Hussey & Hussey, 1997; Mangan, 2004).

Adopting a mixed methods approach means that two paradigms will be used: constructivism and positivism. Constructivism relates to the exploratory stage which usually comprises methods. In-depth interviews were utilised at this stage of the research in order to elucidate the argument which could be examined as the hypothesis during the positivism stage. Thus, qualitative data related to the experiences of the respondents in adoption of CC in ARMG in particular Queensland local councils were collected for the purpose of identifying factors that impact upon or influence the adoption of CC and also to develop the research theories for the subsequent phase.

The positivism paradigms that controlled the quantitative phase of the research were utilised for evaluating the argument created by the qualitative phase (Healy & Perry, 2000; Patton, 2002; Perry, 1998; Perry et al., 1999). During this stage of the research an online survey was carried out. The correlation between variables comprised in a framework which is value-free was assessed in the survey (Denzin & Lincoln, 1994). A positivist approach was utilised through attempting to clarify and recognise the behaviour of the social world by investigating affiliations and patterns among its elementary components. This could not have been completely created without the investigation and understanding by the researcher of the individual factors which emerged in the initial empirical qualitative study.

4.3.4 Research Method (Methodology)

Methodology can be defined as the systematic and theoretical evaluation of the methods used in a field of research (Johnson et al., 2007; Venkatesh et al., 2013). Methodology is the procedure for reaching the findings based on what the researcher discovers through their investigation (Guba & Lincoln, 1994; Perry et al., 1999). There are two types of methods: qualitative and quantitative methods (Johnson et al., 2007; Venkatesh et al., 2013). The methodology for a given research is based on meaning, measurement or a combination of the two (Johnson et al., 2007; Sechrest & Sidana, 1995).

In order to construct a theory, qualitative methods are adopted that require collection and analysis of data to provide the explanation related to the research undertaken (Carson et al., 2001; Parkhe, 1993; Van Maanen, 1979). Under the qualitative technique, a small number of responses are considered to generate a brief description of the problems which are large and wide in nature (Perry et al., 1999). The qualitative technique primarily assists the researcher to produce new relationships and variables which can help to unveil their complicated methods (Shah & Corley, 2006). Qualitative method is used to account for a voluminous quantity of non-numerical data and to ascertain the common patterns of themes (Creswell, 2003). In other words, qualitative research is for the most part utilised as an equivalent word for any data accumulation system (interviews) or data analysis technique (classifying data) that delivers or uses non-numerical data (Saunders et al., 2009). Qualitative methods for research are beneficial as analysis of data along with its elucidation is conducted from the participant's cohort if it is small enough. Consequently, this technique uses the methods which involve in-depth interviews (De-Ruyter & Scholl, 1998).

By contrast, quantitative methods address theory testing rather than theory building (Parkhe, 1993). Quantitative methods are the predominant methodology used in business and management research (Hanson & Grimmer, 2005). A quantitative method is applied, as formal surveys contain planned queries. The study tends to be based on large numbers of participants for a statistical significance and generalisation of finding to the population of interest (Duffy & Chenail, 2008). A quantitative method is used as an equivalent word for any data accumulation strategy (survey) or data analysis technique (graphs or statistics) to prove an existing hypothesis or theory (Patton, 1987).

Some researchers mix qualitative and quantitative methods (Chang, 2006; Dennis & Garfield, 2003; Grimsley & Meehan, 2007; Hackney et al., 2007; Johnson et al., 2007; Keil et al., 2007; Koh et al., 2004; Soffer & Hader, 2007; Venkatesh et al., 2013). The combination of both qualitative and quantitative methods can generate vast approaches for a variety of phenomena. However, the phenomena cannot be fully learned by using only one of the two methods (Venkatesh et al., 2013). The mixed method utilises the pragmatic technique of philosophy which includes the use of induction, deduction, and abduction. Induction is evaluation of patterns; deduction is the evaluation of hypothesis and theories whereas; abduction is the determination of the best description resulted from the research which is understandable and can be relied upon (Johnson & Onwuegbuzie, 2004). So, IT/IS researchers can benefit from using mixed methods. In this research, the researcher identified seven purposes to use mixed methods which are modified from the previous researches (Creswell, 2003; Greene et al., 1989), wholeness is complementary, justification of enhancement in development/assurance for compensation and variability. Table 4.2 illustrates more detail about the purposes of mixed methods research.

Table 4.2: Purposes of mixed methods research

Purposes	Description	Prior IS research	
		Examples	Illustration
Complementarity	Mixed methods are used in order to gain complementary views about the same phenomena or relationships.	Soffer and Hader (2007)	A qualitative study was used to gain additional insights on the findings from a quantitative study.
Completeness	Mixed methods designs are used to make sure a complete picture of a phenomenon is obtained.	Piccoli and Ives (2003) Hackney et al. (2007)	The qualitative data and results provided rich explanations of the findings from the quantitative data and analysis.
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.	Becerra-Fernandez and Sabherwal (2001) Ho et al. (2003) Grimsley and Meehan (2007)	A qualitative study was used to develop constructs and hypotheses and a quantitative study was conducted to test the hypotheses.
Expansion	Mixed methods are used in order to explain or expand upon the understanding obtained in a previous strand of a study.	Ang and Slaughter (2001) Koh et al. (2004) Keil et al. (2007)	The findings from one study (e.g., quantitative) were expanded or elaborated by examining the findings from a different study (e.g., qualitative).
Confirmation	Mixed methods are used in order to assess the credibility of inferences obtained from one approach (strand).	Bhattacherjee and Premkumar (2004)	A qualitative study was conducted to confirm the findings from a quantitative study.
Compensation	Mixed methods enable compensating for the weaknesses of one approach by using the other.	Dennis and Garfield (2003)	The qualitative analysis compensated for the small sample size in the quantitative study.
Diversity	Mixed methods are used with the hope of obtaining divergent views of the same phenomenon.	Chang (2006)	Qualitative and quantitative studies were conducted to compare perceptions of a phenomenon of interest by two different types of participants.

(Venkatesh et al., 2013)

Mixed research methods are more beneficial than a single research method to make significant theoretical contributions (Greene & Caracelli, 1997). Mixed research methods have the ability to address exploratory and confirmatory research questions simultaneously (Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2003, 2009). In social sciences, both research methods are used because they develop a better evaluation and learning of research which included exploration. In addition to this, better understanding can help in developing new views about the theories (Punch, 1998; Walsham, 2006). By contrast, quantitative methods are used in the field of IS for testing of the theory and carrying out confirmation (Walsham, 2006; Johnson et al., 2007).

Powerful assumptions underlie the use of mixed methods for the research (Teddlie & Tashakkori, 2003, 2009; Venkatesh et al., 2013; Johnson & Turner, 2003). Consequently, the use of mixed method makes the researcher view the research with diversity, variability, and correspondence (Teddlie & Tashakkori, 2003, 2009; Venkatesh et al., 2013).

Design of the mixed research methods usually begins with a qualitative research study followed by quantitative research (Morgan, 1998; Punch, 1998; Sale et al., 2002; Venkatesh et al., 2013; Walsham, 2006), although this order can be reversed (Soffer & Hader, 2007). An exploratory qualitative study would offer the vital adaptability to consider diverse choices of discussion with participants (Teddlie & Tashakkori, 2003, 2009; Venkatesh et al., 2013). A qualitative study was used in this research to develop constructs and hypotheses (Becerra-Fernandez & Sabherwal, 2001; Grimsley & Meehan, 2007; Ho et al., 2003). The qualitative research method was used during the initial stage of this research for two reasons. The first reason was to obtain a better understanding about the points of contention in the research. The second reason was to discover the relevant variables that need to be considered in relation to CC adoption by Queensland local councils. Qualitative research findings will inform the design of the survey questions for the quantitative stage (Becerra-Fernandez & Sabherwal, 2001; Grimsley & Meehan, 2007; Ho et al., 2003).

The qualitative method was followed by a quantitative method used online survey technique (Bhattacherjee & Premkumar, 2004). This method is particularly important in the collection of quantitative data that is used by researchers to analyse the data quantitatively using statistical methods. This research used the online survey technique to collect the data because survey can provide efficient, affordable, and relatively accurate means to procure data to fulfil several goals (Zikmund, 2003). The online survey was used for gathering data about the belief, desires, convictions, and behaviour from a group of individuals to classify their responses (Leedy & Ormrod, 2005; Robson, 2002).

4.4 Inductive and Deductive Research

A research approach can be defined as the arrangements and the measures for research which includes the steps taken based on broad assumptions, comprehensive methods of collecting, analysing and interpreting data (Burney, 2008; Saunders et al., 2009). The approaches adopted in a particular research may be deductive, inductive or a combination of both.

The *inductive* approach is based on phenomenology. Phenomenology is the theory which is focussed on the points that are related to the learning of immediate experience gained from face-value. Moreover, it is based on the nature of the experience described in the phenomena instead of any superficial or physical motives and description regarding the reality (English & English, 1958). As the observations are commenced, an inductive approach is started which leads to the development of the theories during the research terminal (Burney, 2008; Goddard & Melville, 2004; Hussey & Hussey, 1997). There are four primary essential steps in inductive research. Observing phenomena is the first step that compresses diverse and detailed raw data into a summarised structure. The second step is the analysis of patterns and themes which formulates themes for the important data. The third step is the formulation of the relationship which focuses on setting up a clear connection among the summary outcomes resulting from the data and the objectives of the research. The last step is to develop theory which aims at building up a model or theory on the fundamental arrangement of experiences or procedures which are visible in the data (Cavana et al., 2001; Thomas, 2006). Figure 4.1 illustrates these steps.

The research layout which is formulated on the basis of a hypothesis extracted from a prior theory and testing of this hypothesis comes under the *deductive* approach (Burney, 2008). The deductive approach is an enormously significant and rational approach, which uses the empirical observations from in depth interviews to devolve and verify the conceptual and theoretical framework (Burney, 2008; Hussey & Hussey, 1997). The primary essential steps in deductive research are: firstly: deduce speculations from the theory (develop theory). Next, the analyst needs to express these theories in operational terms (formulate hypotheses). Thirdly, these operational terms will be expressed in terms of their relationships to one another (collect and analyse data). Finally, a conclusion will be drawn about these relationships and speculations (accept or reject hypotheses) (Cavana et al., 2001; Patton, 2002; Robson, 2002). Figure 4.1 illustrates these steps.

In some research, both of these approaches are utilised together to reach outcomes by explaining phenomena in a better way (Burney, 2008). Elements from both inductive and deductive approaches were used in this research. For improving the adaptability and to investigate and evaluate the themes outlined from the research data, an inductive approach was used (Saunders et al., 2009). In contrast, the generalisability of the research was established by following the deductive approach (Burney, 2008; Saunders et al., 2009). The high level of authenticity and quality of the research findings were improved by the usage of qualitative as well as quantitative data (Patton, 2002). Figure 4.1 practicing these approaches authorised the researcher to move forward from elucidating empirical observations of the real world to unrestrained generalisations as well as hypotheses.

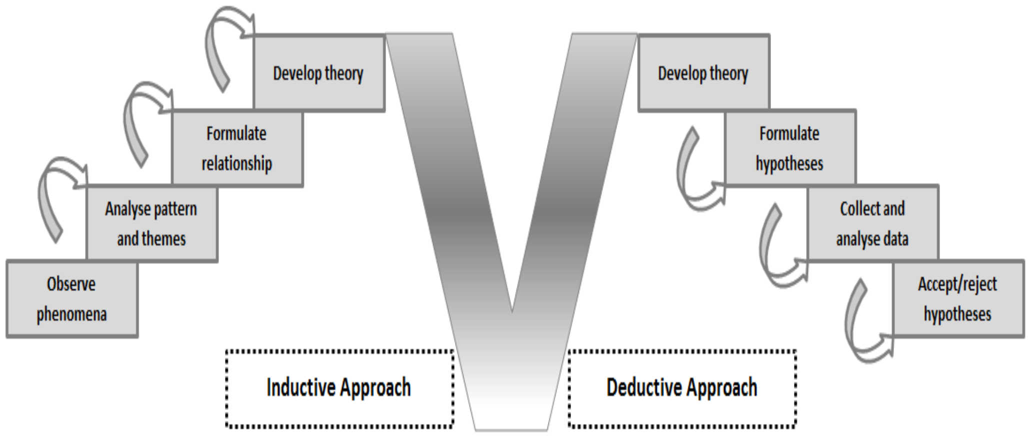


Figure 4.1: Inductive via deductive approaches
Source: Adopted from Cavana et al. (2001)

The use of both approaches (inductive and deductive) gives more benefits over the use of only one approach (Saunders et al., 2007). Inductive research is mainly a subjective approach which contains the determination of fixed meaning. Conversely, in the deductive approach, cause and connection is analysed on an objective.

4.5 Research Design

Research design provides a framework to allow the researcher to gather data to assist the researcher to draw conclusions concerning research issues under investigation (Cooper & Emory, 1995; Nachmias & Nachmias, 1992). That is, this framework provides a guide for collecting, analysing and interpreting of the data (Churchill & Iacobucci, 2009; Thorpe et al., 2002; Zikmund, 2003; Zikmund et al., 2013).

This research investigated the potential for value creation from adopting CC in ARMGs. The extant literature on adoption of CC appears to be limited in reference to ARMGs (see section 2.5 in chapter 2). That is, although literature addresses these issues, there is little detail about the issues addressed in this research. This research used a mixed methods design: an exploratory qualitative method as initial stage followed by a quantitative method.

In this research, the research design had six elements. These elements include: data collection technique; unit of analysis; sample size selection; process of contacting interviewees; development of an interview protocol; and managing the interview process. Each of these elements will be addressed separately in relation to the in-depth interview and the survey methods. Refer to section 4.6.2 to check the research design elements related to the in-depth interview method, and section 4.6.3 to check the research design elements related to the survey method. The flow chart in Appendix A1 gives a clear picture on the research design to this research.

4.6 Research Data Collection Stages

The quality of the data is related to the method employed for data collection. Two major types of data collection are the primary and the secondary data collection methods. Surveys and interviews are the two commonly employed techniques for primary data collection (Hox & Boeije, 2005). On the other hand, the major secondary data sources are journals, websites, books and newspapers (Hox & Boeije, 2005).

4.6.1 Literature Review (Preparation stage)

For evaluating the compulsory initial stage it is necessary to identify the research problem, build theories, and develop methodology during the preliminary stage. This underpinned the identification of the theories of implementation in IT/IS research and support in designing the preliminary theoretical framework. Academic peer-reviewed articles pertaining to study were highly significant. Apart from these, articles presented in proceedings of journals; conferences; books; white papers; government publications; government reports and working papers were considered in this stage for more information on research issues (Walsham, 2006).

The main objective of this research is to examine the CC adoption in ARMGs, in particular Queensland local councils, to identify the factors that are perceived to influence the adoption of CC by the Queensland local councils. The literature review in Chapter 2 found no research into organisational CC adoption by ARMGs, in particular, by Queensland local councils that could have guided this research project. This literature research guided the development of the theoretical framework and highlighted gaps in the literature. These gaps were then explored through the exploratory phase.

For achieving a high level of accuracy and totality of the obtained records for carrying out systematic reviews, an electronic search is necessary (Brettle & Long, 2001; Golder et al., 2014). This research adopted an established search strategy for the literature review, see Figure 4.2. This search strategy has five steps: (1) the selection of the exact key words that covered the research topic (Golder et al., 2014; Higgins & Green, 2011). (2) The high level of quality of the information is reliant on the planning of precise search strategies for each database (Golder et al., 2014; Higgins & Green, 2011). The search strategy should contain two or more electronic data bases to improve the sensitivity, and the hand searching of the lists of references of the contained papers should be carried out (Ali, 2012; Pucher, 2013; Shea et al., 2007). (3) For accomplishing a high quality research data in the chapter dedicated for literature review (chapter 2), the researcher used all the obtainable tools and techniques for each data base for regulating the results of the search consistent with the requirement for comprehensiveness and detail in information (Aleixandre-Benavent et al., 2011; Ali, 2012; Golder et al., 2014; Higgins & Green, 2011). (4) Another significant step in search strategy followed by this research is to check the title and abstract of the selected articles (Golder et al., 2014; Higgins & Green, 2011; Pucher, 2013). (5) The last step of the search strategy is to examine full texts of selected articles to achieve such high quality for the research data (Ali, 2012; Pucher, 2013; Shea et al., 2007).

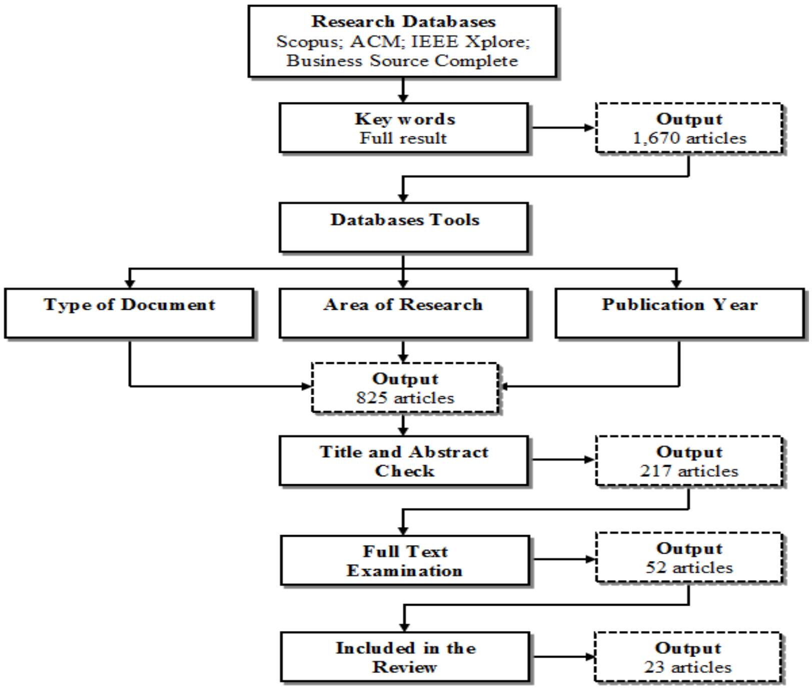


Figure 4.2: Literature review selection process
Source: Adopted from Pucher et al. (2013)

In this research, an electronic literature search was conducted on August 27, 2013 until April 11, 2014. The literature search in this research included five strategies. The ***first strategy*** was the selection of the exact key words that covered the research topic. The researcher must use the AND; OR; NOT; and the truncation symbol * all work in Web of Science (Golder et al., 2014; Higgins & Green, 2011). The search terms that was used to mine data from these databases included the following key words: "cloud computing" AND "challenges and issues" AND "benefits" AND "adoption level" OR "adoption theory" OR "factors affecting" AND "e-government" OR "public sector" AND "Australia". These key words were researched on their own or in combination with others.

The ***second strategy*** was to select more than two databases to increase sensitivity (Ali, 2012; Pucher, 2013; Shea et al., 2007). The main database that the researcher employed for the literature review section in this thesis was the University of Southern Queensland (USQ) database and its related databases. Initially, the process of literature review began with the computer-based sources such as databases including the following: Scopus, ACM Digital Library, IEEE Xplore Digital Library, Business Source Complete, and some government web-sites. These databases were chosen because they provided accessible volumes of research papers relating to CC technology and its adoption theories.

The research fields were confined to the main theme for the purpose of proofing the databases within which the searches were carried out. Table 4.3 provides information on the number of entries and results were retried on diverse databases and how these results were selected and narrowed down. This is just one case of the most frequent keywords which was described above during the search of pertinent themes. Table 4.3 indicates the main databases utilised in the research at the same time displaying all, initial, relevant, and selected results of the research. Some changes in the keywords provided a multitude of sources which were all filtered via search options.

Table 4.3: Database search results

1st Strategy	2nd Strategy		3rd Strategy	4th Strategy	5th Strategy
Key Words Selection	**Database Selection**	**All Results**	**Initial Results**	**Relevant Results**	**Selected Results**
"cloud computing" AND "challenges and risks" AND "benefits" AND "adoption level" OR "factors affecting" AND " adoption theories" AND " e-government" OR "public sector" AND "Australia"	**Scopus**	189	103	73	48
	ACM Digital Library	230	128	68	54
	IEEE Xplore Digital Library	287	161	80	73
	Business Source Complete	216	142	96	86
	Government Web-sites	132	87	54	32
Total		**1,054**	**621**	**371**	**293**

The ***third strategy*** was to use all available tools of each database to reduce the research results by selected published year, field of research, and document type (Aleixandre-Benavent et al., 2011; Ali, 2012; Golder et al., 2014; Higgins & Green, 2011). From the above table 4.3, it can be seen that the all results using the keyword, produced a large number of articles, the first step the researcher followed to narrow the number of articles by using the database tools. These tools were used to reduce the research results by selected published year, field of research, and document type (initial results). For example, Scopus resulted with (**103** articles), ACM Digital Library resulted with (**128** articles), IEEE Xplore Digital Library resulted with (**161** articles), Business Source Complete resulted with (**142** articles), and Government web-sites resulted with (**87** articles).

The ***fourth strategy*** was to check the title and abstract of articles (Ali, 2012; Golder et al., 2014; Higgins & Green, 2011; Pucher, 2013) to ensure that it matches the goals of the research. These lists in table (4.3) were then reduced by selecting the articles that related to the research question based on the review of their titles and their abstracts (relevant results). For example, Scopus shortened to (**73** articles), ACM Digital Library shortened to (**68** articles), IEEE Xplore Digital Library shortened to (**80** articles), Business Source Complete shortened to (**96** articles), and Government web-sites findings shortened to (**54** articles).

The ***final strategy*** was to examine full texts of selected articles. In this strategy the researcher must check methods, participant's details and the outcome of the selected articles for methodological rigor (Ali, 2012; Pucher, 2013). These selections shown in table 4.3 were then scrutinised by doing an in-depth study and analysing their contents' and the articles which contained details that considered suitable for citing in this research, were selected (selected results). For example, Scopus comes out with (**48** articles), ACM Digital Library comes out with (**54** articles), IEEE Xplore Digital Library comes out with (**73** articles), Business Source Complete comes out with (**86** articles), and Government web-sites comes out with (**32** articles).

4.6.2 In-depth Interview (Exploration stage)

The opinions and thoughts of an individual can be elicited by an in-depth interview that is formulated for that purpose (Carson et al., 2001; Rao & Perry, 2007). In-depth interviews provide the researcher with an opportunity to filter out issues pertaining to the theories and knowledge that exist in the research. This is made possible by the use of an iterative interview (Dick, 1998). In-depth interviews make it possible for the researcher to discover and reveal the problems concerning the research through a method which is manageable, and provides a balance in information flow (Rao & Perry, 2003). By using in-depth interviews, a researcher can analyse the interview responses, the subjective approach of qualitative method is reduced (Dick, 1998).

There are limitations which are related to in-depth interviews as a research methodology. In-depth interviews cannot be used solely and must be combined with any other research method such as surveys (Williams & Lewis, 2005). The researcher as interviewer is involved in the process of the data collection and can introduce bias

(Dick, 1998). Bias can be reduced by suitable interview methods, and interviewing validation (Williams & Lewis, 2005).

This type of research is recommended for exploratory studies, where a limited knowledge about the subject matter exists. Data about research factors which influence the adoption of CC in government organisations appears to be sparse (Ramdani & Kawalek, 2007). An exploratory study gives a researcher more data on circumstances about which little is known (Tharenou et al., 2007). Also, exploratory study gives an understanding about the point of contention in the research, and to discover the best variables that need to be considered in relation to CC adoption by Queensland local government councils. Analysing qualitative data can give detailed insights before conducting the survey (Leedy & Ormrod, 2005). Discoveries from the exploratory investigation are meant to advance the enunciation of the exploration speculations, clear-up issues, discover factors that need to be considered in relation to CC adoption, to evoke data about councils, and all the more essentially, discoveries were utilised for the advancement of the survey.

CC is comparatively new and there is uncertainty around the process of its adoption in organisations (Vaquero et al., 2009). This research used a literature review to identify factors that had been empirically shown to impact technology adoption. In order to understand the connection of these factors to CC, it was necessary to explore the issues with implementers of this type of technology. This exploration embedded the theory in the context of cloud computing technology to clarify and assist in model development for further testing and confirmation.

4.6.2.1 Data collection technique

For gathering opinions of key individuals with knowledge and experience in the field of IT/IS and specifically in CC there are many different interview techniques, including: face-to-face interviews, and telephonic or online interview (Zikmund et al., 2013). In face-to-face interviews, the researcher may communicate with an individual in person. This versatile and flexible method is a two-way conversation between the interviewer and respondent. One of the most important advantages of face-to-face interview is the opportunity for detailed feedback (Zikmund et al., 2013). The second type of interview is by telephone or online, where the researcher conducted the interviews by using telephone or online software (Skype). By comparison, the data quality obtained through telephone conversations is equal to the data quality obtained through face to face interviews (Zikmund et al., 2013), where participants are more eager and enthusiastic to give comprehensive and consistent information related to a multitude of areas via phone. The main two advantages that encourage the researchers to use telephonic or online interview are: (1) the speed of data collection; (2) the cost of the telephonic interview. It is estimated that the telephone interview is 25 percent cheaper than face-to-face interview (Zikmund et al., 2013).

In this research, the researcher decided to use the telephonic technique to collect the data from the IT managers at the Queensland local government councils. The main reasons for selecting the telephonic technique were: time and business requirements, senior managers are regularly occupied and it was not simple to arrange time with them, particularly for long-duration interviews. Another reason was the geographical location of the councils, where the distance between councils sometimes involves 4-5 hours driving and this very costly and time consuming.

4.6.2.2 The unit of analysis

Unit of analysis is one of the most important aspects of the research project (Yurdusev, 1993). The unit of analysis is defined as the 'what' or 'who' being studied (Yurdusev, 1993). In research related to social sciences, individuals, groups, and social organisations are considered to be the classic units of analysis (Yurdusev, 1993). The unit of analysis in this research was someone in charge of IT department in Queensland local government council. These individuals can include the following roles: IT director; IT manager who is responsible for IT management and planning; and a director of IT services. These individuals were included because of their presumed level of information; knowledge and proficiency in adoption of CC in Queensland local councils. This allowed understanding of the issue from ICT administration perspective.

4.6.2.3 Sample size selection

IT staff at all Queensland councils were invited to participate. Local government (councils) claim to focus on driving efficiency, improved service delivery and enhancing end user service experience (LGAQ, 2013). Exploring local government councils views can result in a richer information set than other organisations in the same sector. Local government councils provide more information that can assist researchers to identify solutions to improve councils' performance (Scupola, 2003).

Participants were selected from the 77 government councils that are dispersed around Queensland. According to the classification provided by the Local Government Association of Queensland (2013), the 77 government councils were classified into five segments: Coastal, Resource, Indigenous, Rural/Remote and South East Queensland (See Appendix B1). These segments were classified based on the geographical location of the councils, for more details see Table 4.4. The principal motivation behind using these established segments is to investigate which of them has an effective communication infrastructure base to move to CC and which do not and why. These segments are further classified by size of the council. The size of the council is determined based on the number of employees in the each council, for example, extra small (less than 50); small (50-100); medium (100-250); large (250-750); and very large (750-1500). Based on the classification of the councils, the researcher selected one council from every segment and size to ensure inclusion of all segments to obtain a comprehensive overview of the issues.

Table 4.4: Queensland local councils' details

Segments	Size classification					Total	%
	Extra small	Small	Medium	Large	Very large		
Coastal	0	2	6	5	3	16	21%
Resource	0	4	2	3	1	10	13%
Indigenous	0	15	1	1	0	17	22%
Rural/Remote	2	6	11	3	1	23	30%
South East Qld	0	0	2	3	6	11	14%
Total						77	100%

Source: developed for this research

A question arises: "what number of interviews should be conducted at this stage?" and the answer for this question can be found by the analysis of the interview responses. When stability or saturation in the interview responses occurs, which means that no new knowledge is acquired then the interviews should be halted (Guest et al., 2006). This stability is dependent on some aspects such as the skills of the interviewer, the research problems as well as data analysis via in-depth method. Patton (2002, p. 245) pointed out the intricacy of deciding on the number of interviews to be undertaken: "*The validity, meaningfulness and insights generated from qualitative inquiry have* *more to do with the information richness of the cases selected and the observational or analytical capabilities of the researcher rather than with sample size*".

A total of 24 interviews were carried out with IT managers of the chosen councils. The research reached the saturation level within the interview number 18, when the researcher noticed that there was no more new information or patterns in the data emerging from the interviews. Another six interviews were conducted to ensure inclusion of all segments and size classification of the councils to obtain a comprehensive overview of issues, for more details see Table 4.5. Only 21 interviews were used in this research. Three interviews were excluded from the analysis because it was discovered during the interview that these three IT managers did not come from an IT background and did not have any experience or knowledge related to CC.

Table 4.5: Selected local councils

Segments	Size classification					Total	%
	Extra small	Small	Medium	Large	Very large		
Coastal	0	1	2	2	1	6	25%
Resource	0	1	0	2	0	3	12%
Indigenous	0	2	2	0	0	4	17%
Rural/Remote	2	1	2	1	1	7	29%
South East Qld	0	0	1	1	2	4	17%
Total						24	100%

Source: developed for this research

4.6.2.4 Process of contacting interviewees

To begin the in-depth interview process, the number of interviewees required needed to be considered (Kirsch, 2004). The optimum number of interviewees depended on how and why the findings from the research were to be applied (Patton, 2002). The sample for this exploratory phase was deliberately rather than randomly selected. Indeed the aim of the exploratory research is generalise to a body of theory rather than a population (Carson et al., 2001). Based on this principle, the researcher searched local government websites and collected the contact details about all the Queensland local councils and created a list of the local councils and their contact details.

Up to three separate attempts were made to contact each of the sample councils. During the first contact, the researcher called the information desk of all Queensland local councils and introduced himself and gave a brief description about the purpose of the call. This introduction was followed by ascertaining the details of the IT staff working at the councils through qualifying questions that were asked to locate knowledgeable interviewees. Then contact details about IT staff were collected, these details including: their names and their contact details such as phone numbers and email addresses. The second contact comprised sending an email to IT managers of the 77 Queensland local councils to invite them to participate in the in-depth interviews. The third contact occurred one week later when the researcher contacted IT managers of the 77 Queensland local councils and encouraged them to participate in the research interviews. As a result of this, the researcher obtained the acceptance for the interviews from every segment and every size classification. The researcher then created a final list of all IT managers of the selected councils who had agreed to participate. For more details about the selected local councils see Table 4.6.

Table 4.6: Details about selected local councils

Segments	Sector	Interviewee's Position	Council Classification	Category
Coastal	LGC	ICT Coordinator	Urban Regional Small	URS
	LGC	IS Coordinator	Urban Regional Medium	URM
	LGC	IT Manager	Urban Fringe Medium	UFM
	LGC	IT Manager	Rural Agricultural Large	RAL
	LGC	Team Leader ICT Operation	Urban Regional Large	URL
	LGC	IT Manager	Rural Agricultural V. L.	RAV
Resource	LGC	IT Manager	Urban Regional Small	URS
	LGC	Information Services Manager	Rural Agricultural Large	RAL
	LGC	Technical Director	Rural Remote Large	RTL
Indigenous	LGC	IT Coordinator	Urban Regional Small	URS
	LGC	Technical Director	Urban Regional Small	URS
Rural/ Remote	LGC	IT Officer	Rural Remote Extra Small	RTX
	LGC	IT Consultant	Rural Remote Small	RTS
	LGC	IT Network Manager	Rural Remote Medium	RTM
	LGC	IT Manager	Rural Remote Medium	RTM
	LGC	IT Coordinator	Rural Regional Large	RTL
	LGC	IT Manager	Rural Agricultural V. L.	RAV
South East QLD	LGC	Information Services Manager	Urban Regional Medium	URM
	LGC	Manager of ICT Branch	Urban Regional Large	URL
	LGC	Enterprise Architecture Manager	Urban Fringe V. Large	UFV
	LGC	Chief Information Officer	Urban Development V. L.	UDV

Source: developed for this research

4.6.2.5 Development of the interview protocol

The protocol for the interview covered planning, introduction and followed by establishes rapport and neutrality (Gaskell, 2000; Kvale, 1996). Each of these steps will be explored next.

The planning for the interview protocol consisted of defining the required information regarding the research problem (Dick, 1998). The framework for planning in-depth interviews in this research was developed and adapted from various sources (Carson et al., 2001; Gaskell, 2000). The information needed was defined using existed theory (Carson et al., 2001; Perry, 1998).

The introduction was developed to inform the selected respondent about the interview. The selected respondents were approached by telephone. During the telephone conversation the interviewer introduced himself and provided a brief description about the research topic. The interviewer explained in depth details the main purpose of the interview. Further information included the reason they were selected as participants, the type of information that was required and what the participation would require of them (Carson et al., 2001). The research followed ethical codes of conduct in qualitative interviewing (Carson et al. 2001). Ethical clearance was obtained through the USQ (Approval No. H14REA079). After initial introductions the researcher ensured that the interviewee went through the participant information sheet and signed the consent form (refer to Appendix C1 and C2). The participant information sheet and the consent form provided information about the research topic, the contact details of the researcher, the rights of the interviewee, and the purpose for audio recording the interviews. Confidentiality of the interviews was emphasised (Rao & Perry, 2007). The selected respondents were informed that they were free to withdraw their consent to interview at any point of time during the process (Johnson, 2001). The decision whether to take part or not to take part, or to take part and then withdraw, will not affect the participant treatment and relationship with the USQ or where the participant is employed.

The next step was to establish rapport and neutrality (Carson et al., 2001). The researcher introduced himself and provided a brief explanation about the main purpose and scope of the research.

4.6.2.6 Managing the interview process

The interview process was carefully and properly managed and consisted of time setting, an opening question, following up on specific issues, probing questions, and closure of the interview (Gaskell, 2000; Rao & Perry, 2007). The interviewer thanked the participants for their time. Each of these steps will be explored briefly next.

The ***first step*** of this process was to determine the time and the setting of this interview (Carson et al., 2001; Rao & Perry, 2007). The selected respondents were contacted around 10 days prior to the interview and a follow up call was then given to ensure that the right individual had received it. A suitable interview time was agreed by the researcher and each participant (Carson et al., 2001). The in-depth interviews took between 25 to 45 minutes. All of the 24 interviews were conducted by telephone.

After the brief introduction to explain the process, the ***second step*** was to start with the opening questions (refer to Appendix C). The opening questions were formulated for the participants in order to acquire answers which were the representatives of their opinions and ideas regarding the research topic (Carson et al., 2001). Each interview was started by general questions (open questions) related to the research topic such as: "*What is your background, experience and knowledge in relation to CC?"* and: *"How long have you been involved with CC projects and in what capacity?"*

These open general questions had a number of benefits. They provided an opportunity to the interviewees to be able to share their ideas, attitudes and experiences without being fearful of giving incorrect information or feeling not prepared (Nair & Riege, 1995). Such types of questions allowed the interviewer to engage with the participants and develop rapport. These open questions allowed the interviewer to build up a background understanding of the information the participant had to offer, so that later; more direct questions might uncover specific or more complex issues could be developed (Carson et al., 2001) (refer to Appendix C3).

The interview protocol involved probing questions (Carson et al., 2001). These types of questions were required by the interviewer to attain the justification related to the participants' responses or to encourage participants to elaborate on their own areas of interest and expertise. The total number of probing questions increased as more information was collected. Each interview had some probing questions to elicit additional details about factors/issues such as: "*How does the cost have positive impact upon the intention to adopt CC?*" and *"Why Internet speed needs to be considered as important factor when focusing on the adoption of CC".*

The ***third step*** of this process was to invite a summary. Once all questions were asked (refer to Appendix C3), interviewees were invited to provide any additional comments that he/she felt will be appropriate and helpful to the research (Dick, 1998).

The ***final step*** of this process was to conclude the interview. The interviewer thanked the interviewees for their participation and contribution, and guaranteed the confidentiality of their interview data. Also, the interviewer informed the interviewees that they could request a copy of the analysis on their data once it became available (Rao & Perry, 2007). Table 4.7 illustrates a specific details related for each interview.

Table 4.7: Interview summary

No.	Interview code	Date of interview	Type of interview	Period of interview	Years of position	Position title
1.	C25-RTM	12/06/14	Telephone	22 mins	5-10 years	IT Network Manager
2.	C61-URM	12/06/14	Telephone	42 mins	5-10 years	IS Coordinator
3.	C53-RTL	12/06/14	Telephone	26 mins	11-15 years	IT Coordinator
4.	C18-URS	13/06/14	Telephone	31 mins	5 years	IT Coordinator
5.	C15-RAL	13/06/14	Telephone	50 mins	20 years	IT Manager
6.	C52-UFM	17/06/14	Telephone	33 mins	21 years	IT Manager
7.	C55-URS	17/06/14	Telephone	24 mins	5-10 years	Technical Director
8.	C45-RAV	18/06/14	Telephone	30 mins	9 years	IT Manager
9.	C19-RTL	18/06/14	Telephone	25 mins	5-10 years	Technical Director
10.	C68-URL	19/06/14	Telephone	24 mins	12 years	Manager of the ICT Branch
11.	C28-URS	24/06/14	Telephone	25 mins	5-10 years	ICT Coordinator
12.	C21-RTX	24/06/14	Telephone	25 mins	15 years	IT Officer
13.	C74-RTM	25/06/14	Telephone	21 mins	14 years	IT Manager
14.	C39-URM	01/07/14	Telephone	45 mins	12 years	Information Services Manager
15.	C11-RAV	02/07/14	Telephone	28 mins	40 years	IT Manager
16.	C34-UFV	04/07/14	Telephone	35 mins	6 years	Enterprise Architecture Manager
17.	C16-RAL	07/07/14	Telephone	20 mins	5-10 years	Information Services Manager
18.	C7-RTS	05/08/14	Telephone	21 mins	20 years	IT Consultant
19.	C40-UDV	06/08/14	Telephone	29 mins	30 years	Chief Information Officer
20.	C42-URL	11/08/14	Telephone	31 mins	15 years	Team Leader ICT Operation
21.	C72-URS	12/08/14	Telephone	18 mins	5-10 years	IT Manager

Source: developed for this research

4.6.2.7 Validity and reliability of the qualitative stage

Qualitative methods such as in-depth interviews should be evaluated for the dependability (reliability) and validity (Silverman, 2000). Rao & Perry (2003) pointed out that by cross checking, aspects of reliability and validity can be achieved. These different methods of quality controls for qualitative research were taken into consideration by using four different research design tests. These research designs tests can be outlined as the construct validity, internal validity, external validity, and reliability (Yin, 2009). Each of these tests will be described next.

- ***Construct validity***

It describes the progress of suitable operational measures for the concepts being researched (Emory & Cooper, 1991). Construct validity exists under the in-depth interviews as the researcher is constructing an agreement related to the construct meaning by carrying out several interviews (Carson et al., 2001). This method is flexible for various interviews and permits the refined approach of the construct. Construct validity can be obtained by triangulating the interview questions and constructs through the use of two carefully worded questions that determine the same issue from different perspectives (Rao & Perry, 2003). Triangulation of interview questions was designed in this research for the important constructs only in order to prevent iteration or non-concerned perception to the participant (Carson et al., 2001). Each interview included with questions through the use of two carefully worded questions that determine the same issue from different perspective such as: "*What is the impact of the technological factors (such as cost, technological readiness and security) on the intention to adopt CC? Please explain) Do technological factors (such as cost, technological readiness and security) have positive or negative impact on the intention to adopt CC? If so, how? Please explain)".*

- ***Internal validity***

It refers to the validity and relationships of the variables' effects in a system on the other variables (Zikmund, 2000). Exploratory research methods such as in-depth interviews uncover causal tendencies or generative mechanisms which suggest an informal link under certain situations and these links are not assured easily (Perry et al., 1999). The probing questions, in-depth listening methods and existing knowledge are required to develop the cause and effect links which are raised during in-depth interviews and are considered important (Carson et al., 2001). Each interview had some probing questions to elicit additional details about factors/issues such as: "*How does the cost have a positive impact on the intention to adopt CC?", and "Why does Internet speed need to be considered as an important factor when focusing on the adoption of CC?.*

- ***External validity***

It describes the capability of the research results to be generalised beyond to the project scope (Sekaran, 2000). For this purpose, the participants selected for the in-depth interviewing process were chosen because of their knowledge, expertise, and leadership in this field of study, and because their position in the industry influences many people (Carson et al., 2001) (refer to Table 4.7). It was evident from their deliberate selection to ensure that there was enough external validity present for the exploratory purposes of in-depth interviews.

- ***Reliability***

It is directly related to the method's consistency to evaluate the data and to examine the reproduction and repetition of research by other researchers to draw similar conclusions (Sekaran, 2000). Reliability can be authenticated by introducing a co-interviewer to validate cross checking and benchmarking. A second interviewer was not introduced because of the time and financial implications and because of the confidentiality of the participants' interviews would have been compromised (Carson et al., 2001). Instead, the research supervisor associated an expert by forming a committee in order to monitor the process of the research (Guba & Lincoln, 1994).

4.6.2.8 Qualitative data analysis techniques

In this research, the in-depth interview data were analysed using Manual Content Analysis (MCA) method and analysed using Leximancer software.

- ***Manual Content Analysis (MCA)***

Qualitative content analysis is a research method for the interpretation of the content of text data by categorising it systematically in order to carry out the coding and identification of patterns or themes (Hsieh & Shannon, 2005). Patton (2002) defined this analysis method as a meaningful and data reduction attempt which considers a quantity of qualitative data and tries to recognise steady patterns and interpretations.

MCA method is a process of analysis that creates evidence for supporting the analysed content of a research work and investigates its results (Friman & Edvardsson, 2003). It consists of both composed and transparent data-processing methods. In this method, the composed content is categorised into an assortment of groupings as per the chosen criteria, such that frequency of words or terms that ascertains the importance of the research topic (Friman & Edvardsson, 2003; Petty et al., 2004). MCA was undertaken as a first step in the research analysis. It is included three types of activities: data reduction, data display, and conclusion (see Figure 4.3) (Faust, 1982; Glaser & Strauss, 1967; Hsieh & Shannon, 2005; Miles & Huberman, 1984).

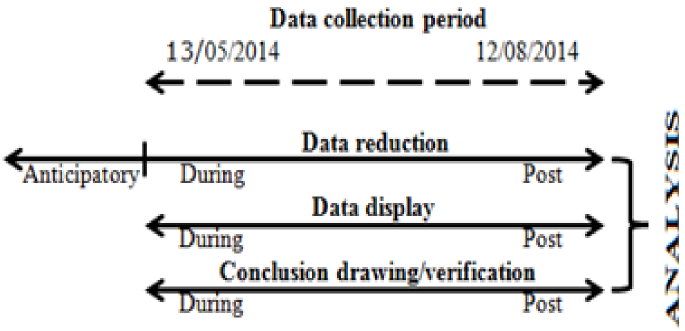


Figure 4.3: Manual content analysis steps
Source: Adopted from Miles and Huberman (1984)

Data reduction is the first step of the MCA process (Miles & Huberman, 1984). Data reduction refers to the process of focusing, transforming, selecting, abstracting, and simplifying the raw data collected through interviews (Miles & Huberman, 1984; Miles et al., 2014). After the completion of each interview session, the recorded interviews were immediately transcribed. The researcher reviewed every interview transcript to create summary sheets for every interview (Carson et al., 2001; Rao & Perry, 2007). A contact summary is a single sheet consisting of a series of focusing or summarising questions about a particular field contact. The summary includes main themes, issues, problems and brief answers to each question, resulting in an overall summary of the main points in the contact (Miles & Huberman, 1984; Miles et al., 2014; Patton, 2002; Schilling, 2006).

The main benefits of creating a summary sheet of each interview are that (Miles & Huberman, 1984; Miles et al., 2014):

- Contact Summary Sheets can be used in a systematic and less open-ended way.
- They provide a quick and practical way to undertake basic data reduction without losing any of the referred information.

After creating the summary sheets the researcher reviewed the sheets thoroughly to develop a pattern code for the research data. Pattern coding is a working set of codes that describe the phenomena and events depicted in the field notes and help the researcher to move to a general explanatory level (Miles & Huberman, 1984, 1994;

Miles et al., 2014; Weber, 1990). Just classifying the data is not adequate for the researcher to understand the pattern its recurrences and answer related questions. This is justified by Kaplan's (1964) remark that the bedrock of inquiry is the researcher's quest for "repeatable regularities".

Descriptive codes which have the ability to make out an embryonic theme, reasoning, or pattern put forward to the analyst are defined as pattern codes. Pattern codes are capable of transforming a variety of materials into consequential and frugal units of examination into a several structures or comprehensive themes. Miles & Huberman (1984; 1994) and Weber (1990) have pointed out various utilities of pattern coding which include:

- Capacity of resolute analysis of data based on the themes subjected to investigation.
- Capability of minimizing high volumes of data into simpler analytic sectors.
- Support the researcher in constructing a cognitive map, which is a developing plan to understand the ongoing process (Miles & Huberman, 1984).

To sum up, data reduction supports in sorting, refining, concentrating, eliminating and organising of data for the purpose of obtaining and verifying conclusions.

Data display - this is the second step of the MCA process. Data display involves the organised assembly of information to permit the researcher to draw conclusions and take actions (Faust, 1982; Miles & Huberman, 1984; Miles et al., 2014). During this step, the researcher designs rows and columns of a matrix for qualitative data, after reviewing the previously created summary sheets and pattern codes. Here, the researcher decides which data should be entered into the cells and in what form so as to represent analytic activities.

Conclusion - this is the final step of the MCA process is conclusion drawing and verification. During the process of data collection, the qualitative analyst decides on the 'meaning' of the different collected notes, patterns, explanations, possible configurations, causal flows and propositions (Bradley, 1993; Glaser & Strauss, 1967; Miles et al., 2014) so as to draw conclusions and to verify them. The summarising and coding of data in data reduction phase leads to new ideas on what should be entered into the matrix for data display. Entering data into the matrix requires further data reduction and as the matrix fills up, preliminary conclusion is drawn (Miles & Huberman, 1984; Miles et al., 2014).

Qualitative content analysis is not responsible for developing statistics and counting; instead, patterns, themes, and categories are produced as these are important for a social reality. Qualitative content analysis is a challenge to adapt for the research; therefore, usually common quotations are used to draw conclusions (Schilling, 2006).

- ***Leximancer Software Analysis***

Qualitative content analysis is underpinned through the usage of multitude of computer programs such as Leximancer and NVivo (Verreynne et al., 2011). The main general goal of these computer programs is to support researchers in managing, arranging as well as coding of qualitative data in a comparatively proficient way (Verreynne et al., 2011). A number of computer programs generate visual presentations for data analysis. This enables the researcher to understand the categories linkages clearly (Verreynne et al., 2011). These computer programs can make a record of history of codes which permits the researcher to check constantly interpretations evolution.

After the manual coding process was completed, data was evaluated for a second time using Leximancer in a purpose to improve the reliability of the findings (Middleton et al., 2011; Smith & Humphreys, 2006). Leximancer is software that performs conceptual analysis of text information irrespective of the language of the text. The program recognises high-level ideas in the text data, and conveys key ideas and actionable points. Leximancer is a mining tool for data that deals with the analysis of content that is collected from text documents, with the search findings then represented visually (Smith, 2007; Cretchley et al., 2010). The software identifies key terms in the text by using word frequency and co-occurrence usage (Stockwell et al., 2009; Verreynne et al., 2011). It provides a conceptual map that illustrates the key concepts found within the text and groups the concepts into themes. This provides a 'bird's eye view' of the collected data (Smith, 2007; Cretchley et al., 2010).

The user of the Leximancer is required to have particular focus on three main sources of information provided by the software: (Bradmore, 2007)

- The key concepts reflected on the map and their comparative significance.

- The potency of individual concepts measured using the number of items it co-occurs with other concepts.
- Resemblances in context where concepts are available.

Information that provided by this software can be presented statistically as well as graphically. For graphical representation the software produces a map that displays notions and themes which allocates the user: "*to perform visually directed searches concepts of interest in order to quantify and explore concept interrelationships*" (Bradmore, 2007). For statistical representation, bar charts are used to display the same information.

Leximancer processes data in four stages: load data, generate concept seeds, generate thesaurus and run project as shown in Figure 4.4. Each of these stages will be described next.

Figure 4.4: Leximancer stages

***Loading data* -** this is the first stage of analysis in Leximancer. Before loading the data, the researcher needs to select the files (doc, html, txt, xml and pdf formats) that have to be processed. The software can select and process multiple files simultaneously. For this research, the interview transcripts were divided into two different parts. The first part includes the factors that need to be considered when adopting CC, current policy level for adopting CC, expected benefits associated with CC, and challenges and risks associated with CC adoption. Questions 4, 5, 6 and 7 were placed in a word doc file for each IT manager of each council. The second part is focused on the effects of TOE and DOI factors on CC adoption. In this part, the interview questions focused on a large of factors, including innovation, technological, organisational and environmental contemplations. Questions 8, 9, 10 and 11 were placed in the word doc file for each IT manager of each council. All the 21 word doc files were transferred to one excel file and was then uploaded in this stage. The separation of the transcript into two parts helped to obtain a greater in-depth of information.

Generate concept seeds **-** is the second stage of this type of analysis and its objective is to generate concept seeds. This stage consists of two different processes. The first process identified as the text processing settings or text processing options, is used for transforming raw data into an arrangement appropriate for processing which includes the making out of sentences and boundaries of paragraphs (Smith, 2007; Cretchley et al., 2010). For this research, the sentence boundaries were set to automatics and the number of names and sentences per block were set to '2 normal' for all analyses. The second process, known as concept seeds identification (concept seeds settings), the software automatically extracts important concepts from the text, which are simple keywords that occur prominently or frequently in the text. For this research, the concepts were automatically identified. This will allow the software to find out many keywords and concepts that the MCA may have not identified.

Generate thesaurus **-** during this third stage of analysis, known as generate thesaurus, there are two different processes. In the first process, called concept seed editing (concept seeds), the researcher can delete unrelated concepts, merge similar concepts or add extra concepts that the software may not have identified (Smith, 2007; Cretchley et al., 2010). For this research, the merging of concepts was interesting because of the structural approach followed in analysis and the interviewer's experiences and perceptions. For example, the concept *Internet access, Internet speed* and *communication infrastructure* were all merged into one concept that became *Internet connectivity.* Singular and plural forms of words were displayed as different concepts occasionally. For instance, if *organisation or benefit* was recognised as a concept in line with *organisations or benefits*, then the two notions were combined to replicate single concept *organisation or benefit*. The second process is known as the 'concept learning setting' or the 'thesaurus setting' phase, where concepts are fundamentally sets of words which move as a whole throughout the document (Smith, 2007; Cretchley et al., 2010). This level recognises groups of words that are associated with the key terms concluded in the previous phases of the software. For this research, the generality level of the concept was adjusted to '12 Default' with the sentences were set to '3 Normal' per block. The themed discovery was adjusted to 'Concepts in any' within the concept profiling of the process.

Run project - this is the last stage of analysis is run project, and it consists of three different processes. The first process is known as 'compound concept editor' (compound concept). In this process the researcher can compound concepts that are similar in meaning. For this research, the concept of *Internet access* and *Internet speed* were compounded into one concept of *Internet connectivity*. The second process is known as classification settings (concept coding settings), in this process the researcher can compare manual coding in traditional content analysis. Once the concepts definitions were learnt, each block of text was "*tagged with the names of the concepts that it contains*" (Smith, 2007; Cretchley et al., 2010). The interviewer tag was selected in the 'Kill Classes' tab of this process and within 'Only Kill Content Block'. The third process is known as output options (project output settings). In this process the researcher can create the type of map. For this research, 'Topical Network' map type was selected.

Concept map - after the completion of the four stages of Leximancer, creating a conceptual map is the last process of the software. These maps construct and display the relationships among the concepts both graphically and statistically.

The existing content analysis is reused in order to discover categories or themes enclosed in the content. It is used to give social reality description which is constructed by those themes or categories since they are the part of certain setting. The use of both Leximancer and manual analytical methods together defines the themes, concepts and gather the dimensions of content (Middleton et al., 2011; Smith & Humphreys, 2006). New models and theories can be produced by coding and deciphering results from the data prepared cautiously. The results are generated through qualitative content analysis and in addition, it also provides the authenticity of prior theories. It also gives brief details of certain phenomena or settings.

4.6.3 Online Survey (Confirmation stage)

A survey was selected as the instrument for the second stage of data collection in this research. A survey provides quick, affordable, efficient, and relatively accurate means to procure data to fulfil several goals (Zikmund, 2003; Zikmund et al., 2013). This includes gathering data about the belief, desires, convictions, and behaviour from a group of individuals to classify their responses (Leedy & Ormrod, 2005; Robson, 2002). A survey can be affected by certain traits of the respondents, including qualities, knowledge, inspiration, and disposition (Robson, 2002).

The survey is an adaptable instrument (Zikmund et al., 2013). It might be completed in diverse ways, such as by email with an attached survey; email with a URL to the survey; a visit to a site by an Internet surfer (Evans & Mathur, 2005; Jankowicz, 2005), or by utilising an online survey tools for respondents, the researchers provide them with ample time to respond with answers and it prevents from causing any inconvenience resulting from phone calls. A survey can provide more confidentiality and comfort due to the absence of survey takers (Evans & Mathur, 2005).

4.6.3.1 Survey data collection technique

In order to reduce bias from the practitioner and acquire an objective benchmark, the survey was selected as the research method (Cavana et al., 2001). The survey instrument preparation has an effect on data collection (Cavana et al., 2001). Collection of data can be conducted through various techniques such as face to face surveys, mailed surveys, and online surveys. All of these types of data collection techniques are different and no superiority lies in any one technique. Consequently, technique is selected according to the research types. Conversely, the wrong selection of survey can lead to unanswered of the research questions.

Online survey are simple tools to use, which are easy to complete and analyse are cost-effective (Evans & Mathur, 2005; Zikmund et al., 2013). These days, with simple access to online survey development firms, online surveys are being directly placed in the database, and afterward arranged and examined in a composed, coordinated way that enormously decreases costs (Frankfort & Nachmias, 2007). In this research, all IT staff at Queensland local government councils have email addresses and all of them are connected to the Internet. Due to the low cost of conveying e-mails and the effortlessness of doing so with online survey tools, the researcher can increase the response toward the survey by sending email-based reminders. An online survey was selected as the best technique for this research.

4.6.3.2 Survey population

A population is the total of all the elements which have a certain set of common characteristics (Hair et al., 2006). A quantitative research sample should reflect the attributes of the population and the results obtained during the research should, apply to the whole population (Sarantakos, 1998). This helps in assuring representativeness of the sample. The more the representativeness in the sample, the more generalisable it becomes, thereby enhancing the research quality. Probability sampling is one of the general methods used to achieve generalizability (Zikmund et al., 2013). When using probability sampling for generalisation improvement in the research population, a higher sample size ensures a lower error factor in generalisation (Saunders et al., 2009). Probability sampling is an adjustment between the amount of time invested in research and the accuracy of the outcome.

Queensland local government councils are key organisations that provide public services to the citizens, community organisations and businesses. The 77 local government councils in Queensland have great dependence on IT innovation to provide their services (LGAQ, 2013). This research focuses on these local government councils and in particular the IT department of these local government councils as the main part of the target population.

4.6.3.3 The unit of analysis

One of the most important ideas in a research project is the unit of analysis (Yurdusev, 1993). The unit of analysis is 'what' or 'who' being studied (Yurdusev, 1993). In social science research, typical units of analysis include individuals, groups, and social organisations (Yurdusev, 1993). The unit of analysis in this research stage was the people (IT staff) who are working in IT department at Queensland local government councils. Those people can include: systems development, analyst, programmer, operations, systems administrator and user support, who are directly exposed to IT at the Queensland's local government councils. Those people were included because of their presumed level of skills, knowledge and experience in a relation to CC adoption in their councils.

4.6.3.4 Survey development process

This section describes how the survey was developed and formulated to answer the research questions. The aims of the development process are to design a survey which should consist of the points that are related to the research objectives. Careful consideration is given to a number of aspects including the types of questions, the survey wording, the layout and structure of the survey. Finally, there is the testing of the survey to evaluate the quality of the collected data.

This research depends upon the research model which has several ideas or concepts called as constructs (Shaughnessy et al., 2012). An operational description is used by the researcher to define the construct (Shaughnessy et al., 2012). Operationalisation is critical process which involves the points which represent the real questions related to the aims and objectives of research to obtain the real specific answers (Cohen et al., 2005).

The survey was developed using constructs validated in the previous research adapted to the technological and organisations studies (refer to Appendix D1). In order to improve a measurement of each construct of the research model, each construct will be conceptualised followed by operationalised. The prior research regarding to any construct is never ignored. In fact, all of the construct measures developed are based on the related literature in the field of ISs (refer to Appendix D1). Some of the instrument questions of some constructs were exploratory from data that the researcher collected from in-depth interviews with IT managers at Queensland local government councils. These addition questions have been added to survey scales (refer to section preparing the instrument 4.6.3.6). In addition, it is worth mentioning that all the used measurements are from peer reviewed papers which have highly ranked and validated literature.

Constructs were operationalised using validated items from previous related researches. Table 4.8 presented all the constructs measures and their source.

Table 4.8: Constructs measures, their source and subject field

Constructs	Sources	Subject field
Compatibility	Cooper and Zmud (1990)	Information Systems
Complexity	Thompson et al. (1991)	Information Systems
Cost	Premkumar and Roberts (1999)	Information Systems
Security concern	Soliman and Janz (2004)	Information Systems
Top management support	Premkumar and Roberts (1999)	Information Systems

Organisation size	Premkumar and Roberts (1999)	Information Systems
Employees' knowledge	Kuan and Chau (2001)	Information Systems
Government regulation	Kuan and Chau (2001)	Information Systems
Information intensity	Chau and Tam (1997)	Information Systems
Benefit	Beatty et al. (2001)	Information Systems

A participant's information sheet design can elicit better survey response (Sarantakos, 1998) (refer to Appendix E1). A participant information sheet was used to explain the research topic and to encourage them to respond. A participant information sheet was attached with the invitation email to detail the research objectives of this survey to the participants. This include statements regarding protecting confidentiality of the responses and reiterating that the data collected was for research only (refer to Appendix E1 and E2). Complete contact details of the researcher were provided along with the survey to enhance authenticity. The information sheet explained the benefit of taking the survey; contact details of the supervisor for further information, followed by a thank-you message (refer to Appendix E1).

The layout is an issue for any survey appearing on the Internet (Zikmund et al., 2013). A survey on the Internet should be easy to use and easy to flow, and have a clean look and overall feel that encourage the respondent to cooperate from the beginning to the end. There are large numbers of software packages and Web survey host sites to help a researcher collects data from Internet (Zikmund et al., 2013).

To avoid any layout issues the layout of this research survey was designed by the help of the Sustainable Business Management and Improvement (SBMI) office at USQ. SBMI is consists of professional people in developing, programming and designing survey layout. The research used USQ Custom Survey System as web survey host site, to assist in data collection and to keep data in secure server.

The introduction and closing of the survey have to be considered to increase response rate (Dillman et al., 2008). To garner respondent's interest, comprehensible and impartial titles were used in the survey. A neutral logo or graphic can be valuable for the online survey.

It is essential for the survey questions to be accurate and precise to ensure good response rate and collection of authentic data. The development stage of the survey requires proper planning, evaluating and revising. Moreover, the researcher is required to consider the length of the survey as well as the simplicity of the conclusion (Fayers

& Hays, 2005). Because longer survey resulted negatively impacts the response rate (Edwards et al., 2002). Hence, the researchers kept the survey concise by avoiding dispensable questions (Zikmund et al., 2013).

Common rules followed in a survey can be outlined as: refrain from the usage of duplicate questions, refrain from including technical and specialised terms, questions should be simple in such a way that participants are able to answer with ease, extensively long questions should be avoided, ensure that all the expected results are tenable and follow a characteristic underlying principle in multiple choice questions and respondents should be given support to complete the survey (De-Vaus, 2002; Zikmund et al., 2013). All of the above mentioned procedures were taken into consideration with the ultimate objective of creating substantial/suitable and explicit questions (Churchill & Iacobucci, 2009), as recommended for the methodology of developing a survey for this type of research. The questions used in this research were of the type of close-ended which participants were persuaded to select the most appropriate response depending on their perception, knowledge and experience (Zikmund et al., 2013). According to Foddy (1994) and Zikmund et al. (2013), these types of questions were selected as a considering the following key benefits;

- Closed-end questions capable of producing quick answers which are comparatively easier to encode, computerise and examine.
- Introvert and less fluent participants are not discriminated by this type of questions.
- Closed-end questions provide a task of recognition over a task based on memory where participants are able to provide answers with ease.

4.6.3.5 Measurement scale development

The most common scale used in ISs researches is the Likert scale (Bhattacherjee, 2012). The Likert scale is a psychometric interval scale that uses rating-type questionnaires to rate a series of mental beliefs or behavioural belief statements to assess respondents’ agreement or disagreement regarding a topic. The Likert scale consists of five or seven points of scale to estimate the agreement or disagreement extent of subjects regarding the statements (Cavana et al., 2001). Many researchers in the field of ISs recommend using five and seven Likert scales to analyse online survey data (Hair et al., 2006; Yu-hui, 2008; Premkumar & Roberts, 1999; Lian et al., 2014; Zhu & Kraemer, 2005; Misra & Mondal, 2011). This specific research utilised a seven-point Likert-scale for ensuring extra level of accuracy and participant's actual response (Finstad, 2010; Lian et al., 2014; Yu-hui, 2008). Sauro (2010) argued that seven points inclined to be a fair balance between maintaining adequate points of discrimination without keeping too many options of response.

In this research the survey scale was coded in a Seven-point Likert-type scale ranging from 1 "Strongly Disagree" to 7 "Strongly Agree" (refer to Appendix E3). The advantages of this variety of response scale is that it provides a broader range of possible scores as well as improves the number of options for statistical analyses for the researcher (Misra & Mondal, 2011; Pallant, 2007; Zhu & Kraemer, 2005).

4.6.3.6 Preparing the instrument

The scope of the survey included questions about the factors resulting from the exploratory stage, which affect the council's eagerness to adopt cloud-based computing. Each part and scale of this survey will be explored next.

The ***first*** part of the survey aims to collect background information about the online survey participants. This part identifies the respondents' demographics and behavioural characteristics of the research population. This part of the survey consists of three items. The first item is about the role of participants in the field of IT. This item is measured on a different category (management; systems development, analyst, or programmer; operations, systems administrator or user support; others), these categories were taken from IT managers in qualitative phase. The second item is about the level of knowledge in a relation to CC. This item is measured by categorised into five different levels (no knowledge; little knowledge; some knowledge; good knowledge; excellent knowledge), these levels were taken from IT managers in qualitative phase. The third item is about the number of total years' experience of the participants with CC projects. This item is measured by categorised into six scales (never; less than 1 year; 2-5 years; 6-10 years; 11-14 years; more than 14 years), these scales were adopted from Straub (1989). The main items of this part are listed in Table 4.9. For more details about this part see Appendix E3.

Table 4.9: Participants background items

Respondents' demographics characteristics
Item
Please tick the item that best describes your role in the field of IT?
How would you rate your knowledge of CC?
Number of total years' experience with CC projects?

The ***second*** part of the survey aims to collect information about the survey participant's local government councils. This part also identifies the firms' demographics characteristics of the research population. This part of the survey consists of seven items. The first item is about the classification size of each local government council combined with the number of employees. This item is measured by categorised into five scales (extra small (less than 50); small (51-100); medium (101-250); large (251-750); very large (751-1500), these size classification were taken from IT managers in qualitative phase. The second item is about the previous adoption of CC in local government councils. This item is measured by categorised into three scales (yes; no; not sure), these scales were taken from IT managers in qualitative phase. The third item is about the current level of CC deployment. This item is measured by categorised into five scales (fully adoption; some adoption; still pilot test; not adopted; not sure), these scales were taken from IT managers in qualitative phase.

The fourth item is about the type of cloud service/delivery model, it is multiple answer items. The participants can choose more than one answer from the range of service/delivery models presented in the survey. These models were taken from IT managers in qualitative phase. The fifth item is about the type of cloud computing deployment model, it is multiple answer items. The participants can choose more than one answer from the range of deployment models presented in the survey. These models were taken from IT managers in qualitative phase. The sixth item is about the purpose of cloud based application within the local government councils, this item multiple answer items. The participants can choose more than one answer from the range of applications presented in the survey. These applications were taken from IT managers in qualitative phase. The final item is about the planning to adopt a CC solution. This item is measured by categorised into three scales (yes; no; not sure), these scales were taken from IT managers in qualitative phase. The main items of this part are listed in Table 4.10. For more details about this part see Appendix E3.

Table 4.10: Information about participants' council's items

Firms' demographics characteristics
Item
What is the size of your organisation in terms of number of employees?
Has your organisation adopted CC technology?
What is the current level of CC deployment within your organisation?
What type of cloud service/delivery model does your organisation use?
What type of cloud deployment model does your organisation use?
What cloud based applications are used by your organisation?
Is your organisation planning to adopt a cloud based services solution in the near future?

The ***third*** part of the survey aims to measure the most significant factors that need to be considered on the adoption of CC. This part gives a clear answer to the objective one (*investigate the factors that need to be considered when planning to adopt CC in ARMGs*). These factors are measured by using a seven-point Likert scale, labelled from "strongly unimportant" to "strongly important". In this research, 13 factors were measured. These factors were taken from IT managers in qualitative phase. All of these factors are listed in Table 4.11. For more details about this part see Appendix E3.

Table 4.11: Factors adopted from qualitative phase

Factors to be considered for cloud adoption	
Code	**Item**
Factor 1	Internet connectivity
Factor 2	Internet speed
Factor 3	Reliability
Factor 4	Availability
Factor 5	Data storage location
Factor 6	Security
Factor 7	Data sovereignty
Factor 8	Cost
Factor 9	Integration
Factor 10	Data backup
Factor 11	Provider dependability
Factor 12	Employees' knowledge
Factor 13	Transportability

The ***fourth*** part of the survey aims to measure the most common challenges and issues likely to be faced if adopting CC. This part gives clear answers to objective two: (*explore the challenges and issues that influence the adoption of CC in ARMGs*). These challenges and issues are measured by using a seven-point Likert scale, labelled from "strongly unimportant" to "strongly important". In this research, 12 challenges and issues were measured. These challenges and issues were taken from IT managers in qualitative phase. All these items are listed in Table 4.12. For more details about this part see Appendix E3.

Table 4.12: Challenges and issues adopted from qualitative phase

Challenges and Issues	
Code	**Item**
Challenges and risks 1	Effective network
Challenges and risks 2	Security and loss of control over data
Challenges and risks 3	Data storage location
Challenges and risks 4	Cost
Challenges and risks 5	Availability of different providers
Challenges and risks 6	Backup of data
Challenges and risks 7	Privacy
Challenges and risks 8	Integration
Challenges and risks 9	Policy maker
Challenges and risks 10	Lack of real understanding of cloud
Challenges and risks 11	Trust
Challenges and risks 12	Business transformation

The ***fifth*** part of the survey provided the items of each construct inside the research model. This part gives clear answer to the objective four: (*develop a research adoption model that can be used to examine CC adoption at the organisational level in ARMGs*), and to give a clear answer to objective five: (*explore the factors that encourage or discourage the adoption rate of CC in ARMGs by evaluating the researcher's proposed model quantitatively with suitable sample size*). Also, this part will help to gives a clear answer to objective six: (*empirically confirm the research model quantitatively and confirm its validity*). These constructs and their items will be addressed next.

- ***Compatibility***

Compatibility is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, four items were used to measure compatibility. Three of these four items were adapted from previous studies such as Ifinedo (2011); Kim and Lee (2008); Lian et al. (2014); Moore & Benbasat (1991); Premkumar and Ramamurthy (1995); Premkumar and Roberts (1999); Thiesse et al. (2011); and Yu-hui (2008) (See Table 4.13-A) (refer to Appendix D1).

Table 4.13-A: Compatibility items adopted from previous studies

Compatibility	
Code	**Item**
Compat1	CC is easily connected with the existing IT infrastructure for the organisation.
Compat2	Using CC system is compatible with all aspects of my organisation.
Compat3	CC is compatible with my organisation's values and beliefs.

Only one item was taken from IT managers in qualitative phase (See Table 4.13-B).

Table 4.13-B: Compatibility items adopted from qualitative phase

Compatibility	
Code	**Item**
Compat1	CC compatibility is not an issue for my organisation.

All These items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Complexity***

Complexity is measured by using a seven-point Likert scale, labelled from “strongly disagree” to “strongly agree”. In this research, five items were used to measure complexity. Three of these five items were adapted from previous studies such as Lian et al. (2014); Premkumar and Roberts (1999); Thompson et al. (1991); Thiesse et al. (2011); and Yu-hui (2008) (See Table 4.14-A) (refer to Appendix D1).

Table 4.14-A: Complexity items adopted from previous studies

Complexity	
Code	**Item**
Complex 1	Using CC system is not seen as complex for business operations in my organisation.
Complex 2	The skills needed to adopt CC are not seen as complex for employees in my organisation.
Complex 3	Integration of CC with the existing IT system presents no problems for my organisation.

The other two items were taken from IT managers in qualitative phase (See Table 4.14-B).

Table 4.14-B: Complexity items adopted from qualitative phase

Complexity	
Code	**Item**
Complex 1	Compared to other types of technologies CC is less complex.
Complex 2	CC complexity is not an issue for my organisation.

All These items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Cost***

Cost is measured by using a seven-point Likert scale, labelled from “strongly disagree” to “strongly agree”. In this research, six items were used to measure cost. Three of these six items were adapted from previous studies such as Kuan and Chau (2001);

Lian et al. (2014); and Premkumar and Roberts (1999) (See Table 4.15-A) (refer to Appendix D1).

Table 4.15-A: Cost items adopted from previous studies

Cost	
Code	**Item**
Cost 1	Maintenance costs of CC system are very low.
Cost 2	Energy and environmental costs of CC system are very low.
Cost 3	CC has low training costs.

The other three items were taken from IT managers in qualitative phase (See Table 4.15-B).

Table 4.15-B: Cost items adopted from qualitative phase

Cost	
Code	**Item**
Cost 1	CC decreases the investment cost in new IT infrastructure.
Cost 2	CC is cost effective compared with the other IS technologies.
Cost 3	CC reduces the costs of systems upgrades.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Security Concern***

Security concern is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, nine items were used to measure security concern. Two of these nine items were adapted from previous studies such as Lian et al. (2014); Soliman and Janz (2004); and Zhu et al. (2006a) (See Table 4.16-A) (refer to Appendix D1).

Table 4.16-A: Security concern items adopted from previous studies

Security Concern	
Code	**Item**
SecC1	CC provides sufficient security transfer channel during the process of mass data interchange.
SecC2	Using CC system solutions is trustworthy.

The other seven items were taken from IT managers in qualitative phase (See Table 4.16-B).

Table 4.16-B: Security concern items adopted from qualitative phase

Security Concern	
Code	**Item**
SecC1	CC provides a secure service.
SecC2	Cloud provider data centers provide greater security of data.
SecC3	Cloud provider data centers have effective redundancy.

SecC4	Cloud provider data centers have effective backup systems.
SecC5	Cloud providers maintain the privacy of an organisation's data.
SecC6	Cloud providers maintain effective data confidentiality.
SecC7	Security concern is not real issue with CC.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Top Management Support***

Top management support is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, four items were used to measure top management support. These four items were adapted from previous studies such as Kim and Lee (2008); Lian et al. (2014); Oliveira and Martins (2008), (2009), (2010); Premkumar and Roberts (1999); Thong (1999); and Yu-hui (2008) (See Table 4.17) (refer to Appendix D1).

Table 4.17: Top management support items adopted from previous studies

Top Management Support	
Code	**Item**
TMS1	Top management is willing to take the risks (financial and organisational) involved in adopting CC.
TMS2	Top management is seriously considering the adoption of an appropriate CC system in my organisation.
TMS3	Top management understands the benefits of CC systems.
TMS4	Top management provides resources to support adoption of CC.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Organisation Size***

Organisation size is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, five items were used to measure organisation size. Two of these five items were adapted from previous studies such as Pan and Jang (2008); Premkumar and Roberts (1999); Thong (1999); and Wang et al. (2010) (See Table 4.18-A) (refer to Appendix D1).

Table 4.18-A: Organisation size items adopted from previous studies

Organisation Size	
Code	**Item**
OZ1	The number of employees in my organisation is high compared to others in the industry.
OZ2	The revenue of my organisation is high compared to others in the industry.

The other three items were taken from IT managers in qualitative phase (See Table 4.18-B).

Table 4.18-B: Organisation size items adopted from qualitative phase

Organisation Size	
Code	**Item**
OZ1	Small organisations are more flexible in adopting CC.
OZ2	Bigger organisations with larger resources can easily move to adopt CC.
OZ3	The size of an organisation impacts its adoption of CC.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Employees' Knowledge***

Employees' knowledge is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, four items were used to measure employees' knowledge. Three items were adapted from previous studies such as Kuan and Chau (2001); Lin and Lin (2008); Thong (1999) (See Table 4.19-A) (refer to Appendix D1).

Table 4.19-A: Employees' knowledge items adopted from previous studies

Employees' Knowledge	
Code	**Item**
EK1	The IS staff in my organisation have the ability to support CC system development.
EK2	The IS staff in my organisation have previous IT development experience?
EK3	Organisations with employees who have more knowledge about CC are likely to more adoption.

Only one item was taken from IT managers in qualitative phase (See Table 4.19B).

Table 4.19-B: Employees' knowledge items adopted from qualitative phase

Employees' Knowledge	
Code	**Item**
Ek1	Employee knowledge in my organisation plays a massive role in the adoption of CC.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Government Regulation***

Government regulation is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, seven items were used to measure government regulation. Two of these seven items were adapted from previous studies such as Ifinedo (2011); Kuan and Chau (2001); Pan and Jang (2008); Yu-hui (2008); and Zhu and Kraemer (2005) (See Table 4.20-A) (refer to Appendix D1).

Table 4.20-A: Government regulation items adopted from previous studies

Government Regulation	
Code	**Item**
GR1	Government effectively promotes CC adoption.
GR2	The data protection policies are regulated by government.

The other five items were taken from IT managers in qualitative phase (see Table 4.20-B).

Table 4.20-B: Government regulation items adopted from qualitative phase

Government Regulation	
Code	**Item**
GR1	Government regulations can provide a better process for adopting CC.
GR2	Current government policy is focused on privacy.
GR3	Current government policy is focused on security.
GR4	Current government policy is focused on all of the risk factors.
GR5	There is no specific government policy on adoption of CC.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Information Intensity***

Information intensity is measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, four items were used to measure information intensity. Three of these four items were adapted from previous studies such as Chong et al. (2009); Kim and Lee (2008); and Thong (1999) (See Table 4.21-A) (refer to Appendix D1).

Table 4.21-A: Information intensity items adopted from previous studies

Information Intensity	
Code	**Item**
II1	The users and organisations in the same industry as my organisation rely on each other for information regarding services.
II2	Users have access to sufficient information on how to use services.
II3	Organisations in the same sector as my organisation can access sufficient information to support a change in services provided.

The other item was taken from IT managers in qualitative phase (See Table 4.21-B).

Table 4.21-B: Information intensity items adopted from qualitative phase

Information Intensity	
Code	**Item**
II1	My organisation is dependent on up-to-date information.

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

The ***sixth*** part of the survey aims to measure the anticipated benefits of the adoption of CC. This part gives clear answer to the objective three (*study the anticipated benefits of the adoption of CC in ARMGs*). These anticipated benefits are measured by using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, 14 anticipated benefits were measured. Four of these 14 anticipated benefits were adapted from previous studies such as Beatty et al. (2001); Kuan and Chau (2001); Lian et al. (2014); Lin and Lin (2008); and Zhu (2003) (See Table 4.22-A) (refer to Appendix D1).

Table 4.22-A: Anticipated benefit items adopted from previous studies

Anticipated Benefits	
Code	**Item**
AB1	Using CC system speeds up application process
AB2	Using CC system improves security of data
AB3	Using CC system improves data accuracy
AB4	Using CC system provides better services

The other 10 anticipated benefits were taken from IT managers in qualitative phase (See Table 4.22-B).

Table 4.22-B: Benefit items adopted from qualitative phase

Anticipated Benefits	
Code	**Item**
AB1	Using CC system reduces IT infrastructure
AB2	Using CC system provides remote access
AB3	Using CC system reduces staff
AB4	Using CC system provides time efficiencies
AB5	Using CC system reduces the level of risk
AB6	Using CC system provides cost reductions
AB7	Using CC system improves disaster recovery and backup
AB8	Using CC system improves flexibility
AB9	Using CC system improves availability of services
AB10	Using CC system improves storage capacity

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

- ***Could Computing Adoption***

Cloud computing adoption is measured using a seven-point Likert scale, labelled from "strongly disagree" to "strongly agree". In this research, three items were used to measure cloud computing adoption. These 3 items were taken from IT managers in qualitative phase as shown in Table 4.23.

Table 4.23: Cloud adoption items adopted from qualitative phase

Cloud Computing Adoption	
Code	**Item**
Adopt1	Communications (email, telephone services, web conferencing, social networking, media monitoring)
Adopt2	Data storage (security, data backup, disaster recovery)
Adopt3	Office productivity (file sharing, collaboration software, management, human resources)

All these items are slightly modified to suit CC adoption. For more details about this construct see Appendix E3.

4.6.3.7 Pretesting of the survey instrument

A pre-test is carried out considering one site to examine all the processes and instruments in order to recognise the required improvement in the research survey (Wholey et al., 2004). This identification of improvements which are necessary is possible only by conducting the pre-test (Waters, 2011).

A pre-test was organised through the USQ academic staff, PhD candidate majoring in IT and some IT staff from USQ IT department. This is in line with the recommendations from Saunders et al. (2009) that obtaining expert advice enhances the validity of the survey and helps in making required changes before actual survey. A group of 50 individuals was asked to provide its thoughts on the survey and suggest any differences. Based on the suggestion by Bell (2005), participants were asked to give comments about the issues they encountered with the survey, the duration required for completion of the survey, the clarity of the instructions provided, if there were indistinct or uncertain questions, if there was any question that was not simple to reply, whether the format was clear and appealing, and if they had any additional remarks. To improve the validity of the survey, the researcher and his supervision team composed a workshop and welcomed various proficient IT individuals from the neighbouring local government councils and USQ academic staff too, to analyse the survey questions and to get the input from employee’s and academic’s viewpoint. The length of this workshop was around 90 minutes, where the researcher and his supervision team opened discussion with IT individuals from local government councils and the USQ academics and studied the survey questions.

Positive outcomes from the pre-test and the workshop helped in recognising issues with wording of the question, format, flow and sequence, grammar and punctuation of the questions, and survey length. Several questions were rephrased to enhance their clarity, for example: *"The IS staff have the previous IS development experience"* rephrased to "*The IS staff in my organisation have previous IT development experience*". Several respondents suggested that modifications should be done to shorten the survey and make it more appealing. In fact, the pre-test outcomes supported the need for generally close ended question in the survey. The time consumed for the respondents to complete the survey was around 8-12 minutes. For the details of the final survey refer to Appendix E3 which was comparatively easily read, contained an enhanced flow of questions, shun ambiguous or leading questions and essentially the participants did not encounter any complexities in understanding and providing answers to the questions.

4.6.3.8 Pilot study of the survey instrument

An important step for the improvement of the effectiveness of the survey is to do a pilot study (Shaughnessy et al., 2012). A pilot study includes actually running the survey to a similar sample of respondents, under the same conditions to those anticipated in the final running of the survey (Shaughnessy et al., 2012). Running a pilot study before the final one is the best way to explore and identify issues and improve the design of the research survey (Waters, 2011). It is very important to obtain pilot study for testing the survey questions (Kothari, 2008). The weaknesses in the survey and its techniques can be explored and identified by use of survey pilot study (Kothari, 2008). Validity, reliability, and practicability of the survey are elevated through pilot study of survey (Cohen et al., 2005). The pilot study assures that the research instructions can be understand by the participants, the possibility of procedure setting and assures the nature of questions which should not be confusing (Cozby & Bates, 2012).

Conducting a pilot study for this research is valuable in terms to increase the accuracy of the survey instrument. Pilot study gives an advance warning to the researcher before going on to the final distribution. The pilot study samples in this research were similarly of those to be involved in the final sample. The final sample in this research is the IT staffs who are working in IT department at Australian local councils.

Accordingly, the pilot study respondents were 30 IT managers who were working in Australian local councils.

- ***Pilot Study Sample***

Researchers are still unable to find any precise answer to what is the accurate sample size. According to Cohen et al. (2005) the exact sample size relies on the environment of the population under scrutiny and the intention of the study. The pilot study size of 12-30 is suggested (Hunt et al., 1982). When pilot study was executed by preferred 30 IT managers, nine curtailed surveys were discarded and entire of 21 surveys that were submitted with a 70 percent response rate.

- ***Pilot Study Demographic Analysis***

Table 4.24 illustrates the pilot study demographic analysis.

Table 4.24: Pilot study demographic data

Variable	Valid	Frequency	Percent
Role in the field of IT.	Management	17	80.95%
	Systems development/ Analyst/ Programmer	1	4.76%
	Operations/ Systems administrator/ User support	3	14.29%
	Other	0	0.00%
Knowledge to cloud.	No knowledge about CC	0	0.00%
	Little knowledge about CC	0	0.00%
	Some knowledge about CC	2	9.54%
	Good knowledge about CC	9	42.85%
	Excellent knowledge about CC	10	47.61%
Years of experience.	Never	0	0.00%
	Less than 1 year	3	14.29%
	2-5 years	8	38.10%
	6-10 years	10	47.61%
	11-14 years	0	0.00%
	More than 14 years	0	0.00%

According to Table 4.24, 17 of the respondents with 80.95 percent were there role in the field of IT as management and only 1 respondent with 4.76 percent was systems development/analyst/programmer, and 3 of the respondents with 14.29 percent were operations/systems administrator/user support. Nearly, half of the respondents with 47.61 percent were have an excellent knowledge related to CC, followed with 42.85 percent of the respondents were have a good knowledge about the cloud. Only 2 respondents with 9.54 percent were found to have some knowledge. In addition, there were no respondents have little or no knowledge about CC. In relation to years of experience, nearly half of the respondents with 47.61 percent were have an experience with CC between 6-10 years, followed with 38.10 percent of the respondents were have an experience between 2-5 years, and only 3 respondents with 14.29 percent were have an experience less than 1 year. These results indicate that most of the respondents have considerable experience related to CC.

- ***Pilot Study Reliability Results***

According to Shaughnessy et al. (2012), the reliability of a measurement is indicated by its consistency. Where the reliability is defined as the consistency of the assessment and is frequently evaluated using the test-retest reliability technique and by accumulation of similar items on a measure, like testing a diverse example of individuals and utilising uniform testing actions, the legitimacy can be uplifted. Any items, when the measurement was assessed, that showed low rates of reliability were eliminated. Based on internal consistency, Cronbach's alpha is a commonly used pointer of reliability that provided the standard of all feasible split-half reliability co-efficient (Cozby & Bates, 2012). Cronbach's alpha was used to evaluate the reliability of the research instrument items (Field, 2009). The acceptable value required for Cronbach's alpha subsisted on a trustworthy degree between 0.7 and 0.8 (Field, 2009; Helms et al., 2006; Stafford & Turan, 2011). Where Alpha Cronbach >0.9 can be interpreted as excellent, >0.8 as good, >0.7 as acceptable, >0.6 as questionable, >0.5 as poor, and **<0.5** as unacceptable (George & Mallery, 2003; Calaguas & Dizon, 2011). Table 4.25 demonstrates the value of Alpha Cronbach for all the survey instrument construct.

Table 4.25: Reliability coefficients of the scale items (Cronbach Alpha)

Constructs	Alpha Cronbach Stage One	No. of items	Alpha Cronbach Stage Two	No. of items
Compatibility	**0.643**	5 items	**0.709**	4 items
Complexity	**0.592**	6 items	**0.702**	5 items
Cost	**0.840**	6 items	**0.840**	6 items
Security concern	**0.760**	9 items	**0.760**	9 items
Top management support	**0.516**	6 items	**0.809**	4 items
Organisation size	**0.770**	5 items	**0.770**	5 items
Employees' knowledge	**0.754**	4 items	**0.754**	4 items
Government regulation	**0.836**	7 items	**0.836**	7 items
Information intensity	**0.695**	6 items	**0.711**	4 items
Anticipated benefit	**0.903**	15 items	**0.903**	14 items
Cloud adoption	**0.756**	3 items	**0.756**	3 items
Total	######	**72 items**	######	**65 items**

4.6.3.9 Validity and reliability of the quantitative stage

One of the prime objectives that is pursued in order to achieve the goals of this research is the collection of data from a variety of different sources. The researchers check the validity and reliability of data because they are fundamental cornerstones of the scientific method to measure the quality of data (Cozby & Bates, 2012; Lancaster, 2005).

- ***Internal Validity***

It determines the structure of an experimental design and explains every stage of the methodology of the scientific research to evaluate cause and effect association of empirical evidences (Campbell & Stanley, 1963; Cohen et al., 2005). Validation is the mechanism of what should be measured in research method (Bhattacherjee, 2012). The nature of research greatly affects the validity since there is no common scale of validity. As a result of that, the content validity from distinctive IT staff, academics, and other participants in the pre-test and workshop will guarantee the validity of this research.

A researcher should focus on the input of professionals such as IT experts and academics to measure content validity, because they have complete command on subject on which is conducted (Cavana et al., 2001; Hair et al., 2006). In this research, some items were adopted from previous studies and others were taken from IT managers in qualitative phase. Details were given in section (4.6.3.6). Many researchers have pointed out the importance of guaranteeing the ideas that will be reflected while using new measures to check data (Bryman & Hardy, 2004). The content validity of the information represented from the research tool was conducted upon a comprehensive review of the available literature, by comprehensive process of article selection and modification during the stage of survey development. Tools of measurement used for evaluating the constructs were deduced by strictly defining variables used in previous observational studies into measurable factors, and were moderately refined to match the requirements of the research as well as emulated by a pre-tests and workshop.

An academic who was an expert in ISs and CC field was consulted in pre-test of survey instrument. To ensure strong validity, PhD candidate majoring in IS/IT were also consulted to pre-test the instrument. The survey was given to 50 people out which, 22 were academic including this research project's supervision team. 15 persons were IT professionals and some of them were IT business consultants from Local Government Association Queensland (LGAQ) and 13 were PhD students. 42 people sent back information and their comments. Furthermore, researcher organised a workshop and various IT professionals located in neighbouring councils and USQ academics were asked to critically evaluate the questions in survey. The aim was to observe the survey from academic's perspective and employees of different organisations. The 90 minutes workshop helped researcher in developing the perception of professionals on this research. Open group discussion with IT individuals and supervision group gave fundamentals to summarise the survey instrument, and flows in questions and formatting were checked. The result was effective and highlighted that viewpoint of professionals and IT experts were significant for survey. The content validity was acknowledged in survey as well.

- ***External Validity***

It refers to examining the results based on generalized to persons and questioning whether there are any other possible arrangements and times (Ghauri & Grønhaug, 2005; Golafshani, 2003). The lack of external validity is a critical drawback to research in the field of IS/IT. This research has no claims to account external validity like similar previous studies such as Grandon and Pearson (2004); and Lee (2004).

- ***Reliability***

Reliability is focused on the consistent recorded responses by the respondents and any specific outcomes must be intrinsically repeatable (Field, 2009; Gill & Johnson, 2002; Golafshani, 2003). According to reliability, the results should be accurate and consistent. If compiled result is accurate to the total participants it can be considered reliable (Golafshani, 2003). The research instrument is understood to be reliable if the research results are replicated after repetition with same methodology and consistency of results is evident, while the Reliability is the accuracy of results produced on total population. (Golafshani, 2003).

In this research, all items were analysed in detail and checked thoroughly. The test of reliability to estimate the measurement's internal consistencies was carried out in the pilot study. For every construct of items of each group the internal consistency was assessed via Cronbach's alpha. The use of IBM SPSS Statistics 22 for calculation of Cronbach's alpha is the evidence of internal consistency reliability (Cozby & Bates, 2012). Many researchers have articulated that 0.7 is an accepted value (Field 2009; Helms et al., 2006; Stafford & Turan, 2011). In order to increase the alpha co-efficient some of the items were removed as a result. The details of Alpha Cronbach are shown in Table 4.25 in section (4.6.3.8).

4.6.3.10 Survey administration and data collection

In this research, an online survey method was chosen because of the accessibility of the Internet for all intended participants and the belief that participants would prefer this approach. In order to make the survey available 24/7, an online survey service provider was found and the online survey link was offered for 3 months from March 1, 2015 to May 31, 2015. The survey was distributed through providing the online link to all the participants; to avoid participants performing the survey twice, the online server saved the IP of all the participants for 3 months. There are 77 local government councils in Queensland. Each council IT managers was asked to forward the survey link to their staff through email, SMS, or social media sites.

This survey was distributed online to Queensland's 77 councils through USQ's Custom Survey System. IT Managers from 47 councils responded to the survey which represented a response rate of 61 percent. The other 30 councils which about 39 percent did not respond to the survey, where 9 out of the 30 non-participating councils with 12 percent stated that that they were working under government regulations and could not give out any information that related to their councils strategy. The other 8 out of the 30 non-participating councils with 11 percent stated they did not participate because they did not have any IT staff in their councils and their IT department was outsourced. About 13 of the 30 non-participating councils with 16 percent did not participate in the survey because they did not respond to any of the attempts by the researcher to contact them. For more details see Table 4.26.

Table 4.26: Survey details

Survey Details		
Survey participant	**No. of councils**	**Percent**
Survey received	47 Councils	61%
Survey not replied	30 Councils	39%
Total	77 Councils	100%
Not Respondents Councils Details		
No. of councils	**Percent**	**Reasons**

9 Councils	12%	Because of government regulations
8 Councils	11%	Because their IT were outsourcing
13 Councils	16%	Because they did not reply to the survey

The participating 47 councils had around 786 IT staff who may have been invited to participate and 480 responded.

4.6.3.11 Quantitative data analysis techniques

Data analysis is the organised methodology of applying intelligent and factual systems to sort, show, recap, and dissect gathered information. The first step of the quantitative data analysis techniques was to present the descriptive statistics. This step was to demonstrate the demographic statistics in order to have some demographical and behavioural background of the survey respondents. The second step of this analysis process was to evaluate the validity and reliability of the instrument. Since, this research supported by LGAQ, the specialist hopes to have high reaction rate. In this case, the survey data will be examined by utilising SEM.

SEM is intended for working with various related equations concurrently; it provides various favourable circumstances over some more recognisable strategies, and hence, offers a general outline for linear modelling. SEM permits extraordinary adaptability on how the equations are specified. The improvement of a suggestive graphical dialect (McArdle & Mcdonald, 1984) has accompanied the advancement of SEM as a statistical system. Because of this dialect, complex connections could be displayed in a helpful and capable approach to others not acquainted with SEM.

4.7 Ethical Considerations

There are certain ethics and standards connected to research of any field which must be followed by every researcher. The research can only be accepted in such circumstances if all ethical standards are met during conducting a research or studying the research findings; for instance, confidentiality of participants of research must be maintained by researcher and researcher cannot reveal the identity of participant to his/her organisation (Cavana et al., 2001; Cooper & Emory, 1995). Researchers not only have to take care of dignity of participants and their welfare but also those who, in any way, can become affected by implications of research. Revealing information is not only violation of privacy but also an ethical implication for individuals as they are vulnerable to the effects of the research. Researchers can encourage willing participants to take part in research; also participants cannot be pressured to give input for the research because it is ethically wrong (Lincoln & Guba, 1985; Patton, 2002).

The National Statement on Ethical Conduct in Human Research (2007) was introduced in Australia to set clear instructions to individuals and organisations to carryout research involving human participants in accordance with the ethical standards. The National Statement is a series of guidelines that layouts for a researcher. It establishes a comprehensive mechanism for researchers to avoid any ethical problem during and after the completion of research. The institutions in Australia are bound by law to establish ethical review procedures for research involving humans. After introduction of National Statement, all research institutes whether universities, private individuals or government organisations all need consent of Human Research Ethics Committees (HREC) to conduct research that involves humans. The function of these committees is to ensure that government legislation and laws about anonymity of participant in research, secrecy of identity of an individual are followed in research proposals. HREC is a legal requirement and required by all researchers to seek approval of it.

The HREC gives detailed guidelines on ethical standards to all researchers so that all potential ethical issues can be avoided during conducting a research. This research will also comply with call ethical obligations and follow guidelines of the HREC at the USQ. The ethics rules will be applied on all documents including: consent form (for interview and survey); participation information sheet (for interview and survey); interview instrument; survey instrument; and confirmation letter were submitted to HREC at USQ before initiating this research. After reviewing the application, HREC raised some comments about the distribution process of the Consent form and Participation information sheet that related to the telephonic interview. HREC also raised other comments on how the audio recordings will form part of the research methodology, and other comments related to the pilot study and data storage location. To seek approval of HREC, researcher made all the necessary adjustments to every comment that received from HREC and gave depth details to make clarification about these comments. After that, HREC reviewed the researcher’s solutions for their concerns and gave approval to this research and the approval number of H14REA079 (refer to Appendix F1).

The invitation letters and participant information sheets for research purposes were sent to 77 councils around Queensland after getting the approval from HREC at USQ. The purpose of sending Participant information sheet and invitation letter was to share the details and purpose of the research and invitation to participations respectively. It was also disclosed that participation would be voluntary. The participants had the liberty to withdraw from being part of research at any time and they were asked to contact researcher and the supervision team for questions on their own (Lincoln & Guba, 1985; Patton, 2002). The concerns of ethics are there in all research stages that include collection of data; analysis; and publication of data as well (Burton, 2000).

A consent form was distributed among participants to get their approval and their willingness to participate in this research. This gave participants right to agree or disagree to engage in this research. Consent form was first completed to move toward initiating research and collection of participants' inputs and data. All participants were given full opportunity to read details and the purpose of research before become voluntary participant in research. They were also informed about interviews and survey which are part of collection of data necessary to complete research.

4.8 Summary

This chapter presented the research methodology that used to gather and analyse data to try to answer the research problem that this thesis addressed. This chapter is divided into four sections: the first section explained the research philosophy. Then, the second section discussed the selected research approach. The following section outlined the research design; and finally, there was an in-depth discussion of the research data collection stages and analysis methods. The following chapter outlines and discusses the findings of the qualitative stage of the research (exploratory study).

5 CHAPTER FIVE:-

QUALITATIVE DATA ANALYSIS

5.1 Overview

The previous chapter presented the research methodology that was used to gather and analyse data to answer the research problem that this thesis addressed. This chapter presents the data analysis and findings of the exploratory stage of the research. The purpose of this qualitative analysis was to identify the potential factors that were perceived to influence successful CC adoption. The research explored the potential for value creation from CC in ARMGs, by identifying factors that were perceived to influence the adoption of CC; including anticipated benefits, challenges and issues and the current level of policy surrounding the concept. This exploratory method involved 21 telephone interviews with IT consultants, experts and managers, all selected and recruited from Queensland local government authorities. This chapter is divided into four sections. The first section reports on the participants' perspectives. The second section discusses the participating councils. The third section segments the findings of the research into the critical driver categories of CC adoption and further delves into a discussion of these drivers. The fourth section presents and discusses the findings from the exploratory stage that specifically relates to the proposed research model.

5.2 Participants' Position

This research seeks to explore the potential for value creation from CC in ARMGs, by identifying factors that are perceived to influence the adoption of CC. The research sought to provide a theoretical model for Australian local councils. The twenty one participants held a range of ICT-related positions including management, co-ordination roles and other IT related roles. For more details related to the interviewees' positions; refer to Methodology chapter, section 4.6.2.4, Table 4.6.

The majority of interviewees were IT managers. These interviewees were selected as they were predicted to have first-hand knowledge and experience on the subject being investigated. These participants hold various positions and titles in the IT industry however have primary similar functions and responsibilities.

5.3 The Participating Councils

Councils were categorised based on their segments and size classification (Rural/Remote, Resource, Coastal, Indigenous and South East Queensland). Across all categories there were different levels of communication infrastructure required for CC and also differences in council size. Based on the classification of the councils, one council from every classification and size was selected to ensure that the research is inclusive of all segments (refer to the methodology chapter, Table 4.7).

5.4 Critical Drivers of Cloud Computing

This section provides a details about critical drivers of cloud computing such as factors to be considered in cloud computing adoption, level of policy for cloud computing adoption, anticipated benefits of cloud computing adoption, and challenges and issues that faced the adoption of cloud computing.

5.4.1 Factors to be Considered in Cloud Computing Adoption

The first research issue investigated was the factors that are seen as catalysts for the adoption of CC. These included: Internet connectivity including (Internet speed, availability, and reliability); data storage location (including security and data sovereignty); cost, integration, data backup, provider dependability, employee's knowledge, and transportability. The main factors identified by the participants, based on their knowledge and experience as IT specialists, is presented in Table 5.1.

Table 5.1: Factors to be considered in cloud computing adoption

Factors	C7-RTS	C11-RAV	C15-RAL	C16-RAL	C18-URS	C19-RTL	C21-RTX	C25-RTM	C28-URS	C34-UFV	C39-URM	C40-UDV	C42-URL	C45-RAV	C52-UFM	C53-RTL	C55-URS	C61-URM	C68-URL	C72-URS	C74-RTM	Frequency	%
Internet connectivity	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	19/21	90%
• **Internet speed**	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●				17/21	81%
• **Availability**		●		●			●	●			●	●		●	●					●		9/21	43%
• **Reliability**		●		●			●	●			●	●		●	●					●		9/21	43%
Data storage location	●	●		●	●	●	●	●	●	●			●	●	●		●	●			●	15/21	71%
• **Security**			●	●			●			●		●						●		●	●	8/21	38%
• **Data sovereignty**									●	●				●		●						4/21	19%
Cost	●	●	●						●		●	●	●			●		●	●	●		11/21	52%
Integration	●											●	●	●	●				●	●		7/21	33%
Data backup			●			●							●							●		4/21	19%
Provider dependability					●			●				●							●			4/21	19%
Employee’s knowledge	●										●					●						3/21	14%
Transportability									●					●								2/21	10%

- **Internet connectivity**

Internet connectivity was identified as one of the most significant factors that required consideration for CC adoption. About 90 percent (19/21) of the sample agreed that Internet connectivity influenced levels of adoption. There were two main reasons provided:

1. Councils were located in rural and regional settings and do not have the same level of access to high-speed Internet compared to councils in metropolitan areas.

> "*The other key factor is in regard to connection bandwidths because we are in regional Queensland (rural areas). We do not have access to a lot of high-speed Internet*" (C28-URS).

2. Internet connectivity in rural and regional areas is limited and expensive.

> "*Because we are in regional area our Internet connection or the options for Internet connectivity is limited and also it is expensive and that is a major limiting factor from our point of view*" (C61-URM).

The participants identified other factors that affected Internet connectivity. These factors included Internet speed, availability, and reliability.

The findings of this stage of the study confirmed that Internet speed was one of the most important factors related to Internet connectivity in CC adoption. Approximately 81 percent (17/21) of the sample agreed that without high Internet speeds, the adoption of CC is of limited value.

> "*If you do not have high-speed Internet, you are not going to be able to run your business on CC*" (C40-UDV).

Approximately 43 percent (9/21) of the sample indicates that the availability of services that organisations provided through the use of CC is one of the significant factors that must be considered when planning to adopt CC. The participants said that without the availability required, the advantages that CC promises to provide will not eventuate:

> "*It is the ability to be able to connect to the data when you want it. That depends on availability of connections and connection speeds and the other things*" (C21-RTX).

The importance of having a reliable Internet connection was voiced by approximately 43 percent (9/21) of the sample. The participants pointed out that CC would not be as effective if the reliability of the connection for CC is not proven or as strong as it should be:

> "*Because we are in a remote location, the reliability of Internet connection is one of our main considerations because if we lose connectivity, we just do not have access to anything*" (C16-RAL).

- **Data storage location**

This research confirmed the prior research findings, that data storage location is one of the significant factors that must be considered for CC adoption. Approximately 71 percent (15/21) of the sample commented that this was an important factor. Sometimes data is stored off-shore and it is essential to know the location and details of the off-shore storage system and make arrangements for maintenance and the identification of the parties involved. Some of the participants highlighted the importance of the data storage location:

> "*It is one of the important factors, we tend to store our own data in-shore because it is just too expensive to ship it else with*" (C7-RTS).

CC raises a range of important policy issues in relation to data storage location, these include security issues and data sovereignty.

Approximately 38 percent (8/21) of the sample highlighted that security of data was a significant factor related to data storage location and is required to be considered for CC adoption. They stated various reasons for why they believed that the security of data should be considered before transferring to and completely adopting CC technology. The IT managers were concerned with external factors that may negatively impact the storage systems and unauthorised access of data:

> "*Because we are in a public cloud, we could be sharing an infrastructure with other organisations, so the security of the information has to be encrypted both in terms of stored new information in the cloud, and also in the transmission of that information*" (C34-UFV).

Other participants who were concerned with security wanted to store their data within the country to ensure better protection for organisations and their stakeholders. This was seen as a way of reducing the risks of security breaches and similar risks:

> "*Our governments do not want to store their information off-shore especially if it is sensitive information. Like the commercial-sensitive or personal-sensitive information, there are still some policies and still some concerns about storing that information off-shore in a different jurisdiction"* (C34-UFV).

Related to the data storage location issue, this research found that maintaining sovereignty over the data was identified as an important factor to be considered in transitioning to CC technology. Approximately 19 percent (4/21) of the population held this view. Participants wanted to ensure that their data, their rights and their sovereignty are protected under Australian government laws:

> "*Data space sovereignty is a big issue there. Make sure that the Australian laws apply to it. Then we basically have access to a data*" (C45-RAV).

- **Cost**

Approximately 52 percent (11/21) of the respondents stated that cost is one of the significant factors that must be considered for CC adoption. They said it was stated that there were no figures available to justify CC as a cost effective solution:

> "*I suppose one of the biggest things for us is, it has to be a cost effective solution. We need to prove that CC is cost effective*" (C15-RAL).

- **Integration**

In this research, the integration of systems, applications and software was another major factor found to be important when considering whether to adopt CC. Approximately 33 percent (7/21) of the participants considered integration to be a very important factor as the software and other systems would not perform appropriately if the organisations cannot integrate them appropriately:

> "*Integration is one of the biggest issues. How do you integrate your cloud technologies with your current legacy applications? Because we are housing applications in different locations and the applications are used to working in environments that have zero or very low latency, we are not going to get that in our cloud environment that is going to be one of the biggest issues*" (C40-UDV).

- **Data backup**

Approximately 19 percent (4/21) of the participants pointed out the necessity of data backups in case of unexpected issues:

> "*If they can guarantee that they have a backup solution, they have got policies and procedures in place, so if there is a catastrophic failure, we will be backup and running within a decent time frame and none of the data get lost. Because we would be losing hundreds of thousands of dollars a year*" (C74-RTM).

- **Provider dependability**

Provider dependability emerged as a new theme that was not identified in the literature as a factor affecting the decision to adopt CC. Provider dependability is the degree of trust that is placed in a provider to have control over the organisation's data. Approximately 19 percent (4/21) of the sample found that provider dependability is a significant factor that is required to be considered for the adoption of CC. This trust that is given to cloud computing service providers might result in a loss of control over the data.

> "*The risk around the dependability of cloud is that we are essentially giving a trust and a lot of control over our data to the cloud providers and we just have a little control over that data, as a result of that, our guards against risk need to be higher*" (C68-URL).

- **Employee's knowledge**

Approximately 14 percent (3/21) of the sample population described how employees adopting CC should have enough skills and knowledge to manage the new technology that they are utilising to provide quality service to their stakeholders:

> "*If the staff in the organisation have a full experience with CC, it would certainly affect the decision, but whether it would actually encourage them*" (C25-RTM).

- **Transportability**

Another new finding of this study is that transportability is an important factor when considering whether or not to adopt CC. Transportability is the capability and flexibility of the equipment, systems and associated hardware that permits them to be moved from one location to another to interconnect with locally available and complementary equipment, systems, associated hardware, or other complementary facilities. Approximately ten percent (2/21) of the sample population explained that this factor can be associated to availability of data backups, a previously mentioned factor. The participants explained that in order to have data backups, transportability of data should be available and accessed:

> "*We need to make sure that we have the flexibility to recover back our data, in case we decided to move from one CSP to another one or decided to return the data back to our house. So, transportability of the data is an important factor that we need to discuss with CSP*" (C45-RAV).

5.4.1.1 Comparative analysis of factors to be considered for cloud adoption

The interview data was reanalysed using Leximancer to improve the reliability of the findings from the MCA (Middleton et al., 2011; Smith & Humphreys, 2006). The first step is focused on the wide range of business-related words used by the respondents and identified from the exploratory Leximancer analysis. The second step for analysing the data was to examine the thematic groupings. Leximancer uses a natural language processing algorithm, so the theme is titled by the concept with highest prominence in the thematic aggregation. In this analysis, Leximancer clustered the concepts into seven themes (cloud, cost, need, data, important, speed, systems), each theme aggregating two or more concepts and represented by labelled circles as they have been illustrated in Figure 5.1.

Figure 5.1 illustrates the view of IT managers' on factors that need to be considered for the adoption of CC in ARMGs. This figure depicts that the central theme within the map was 'cost' and is strongly linked to the themes cloud, and need. The dominant theme of cost has strong associations with most other concepts on the map. Cost is multifaceted in its use: relating to systems, service, people, storage, connection, data, and regional. The concepts people, service, needs, storage and infrastructure are shown to be frequently occurring and strongly connected to the theme cost. Other themes illustrated but not connected to the theme cost include data, importance, speed and systems. However, it was also shown that the theme speed, importance and data are strongly connected to each other. The centrality of this theme provides a starting point for the research analysis.

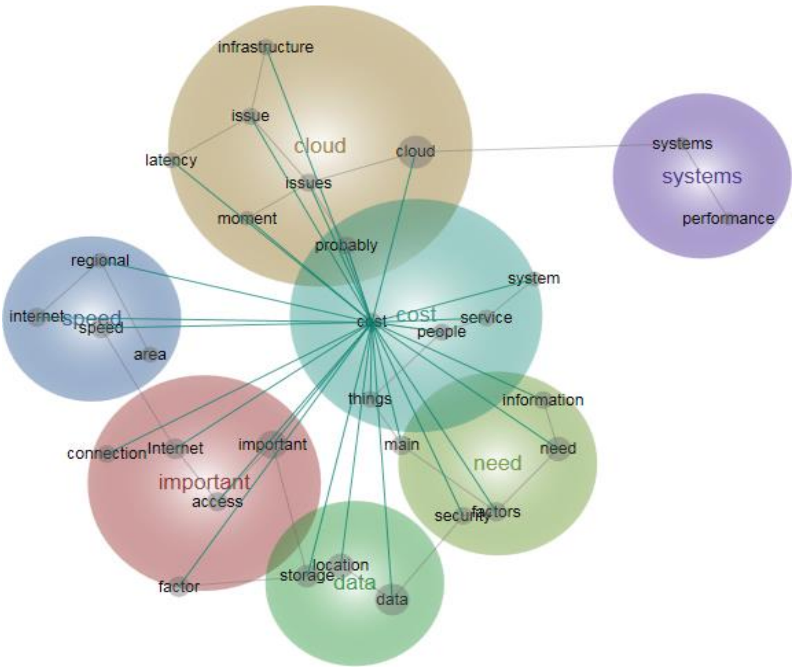


Figure 5.1: Factors key concepts map

The theme of 'need' which contains the concept 'factors' links strongly to the findings within the MCA which suggested that IT managers saw CC as having factors that need to be considered within their organisations before deciding whether or not to adopt. For more detail see Figure 5.2.

The concept 'factors' and its linkages on the concept map, through the analysis, have been illustrated through Figure 5.2. This concept is linked to all other concepts on the map. These linkages are to be expected, with 'factors' being the top ranking concept. The strongest linkages shown in Figure 5.2 are as follows: (a) between factors and security, (b) between factors and data, (c) between factors and location, (d) between factors and storage, (e) between factors and performance, (f) between factors and cost, (g) between factors and access, (h) between factors and speed and latency.

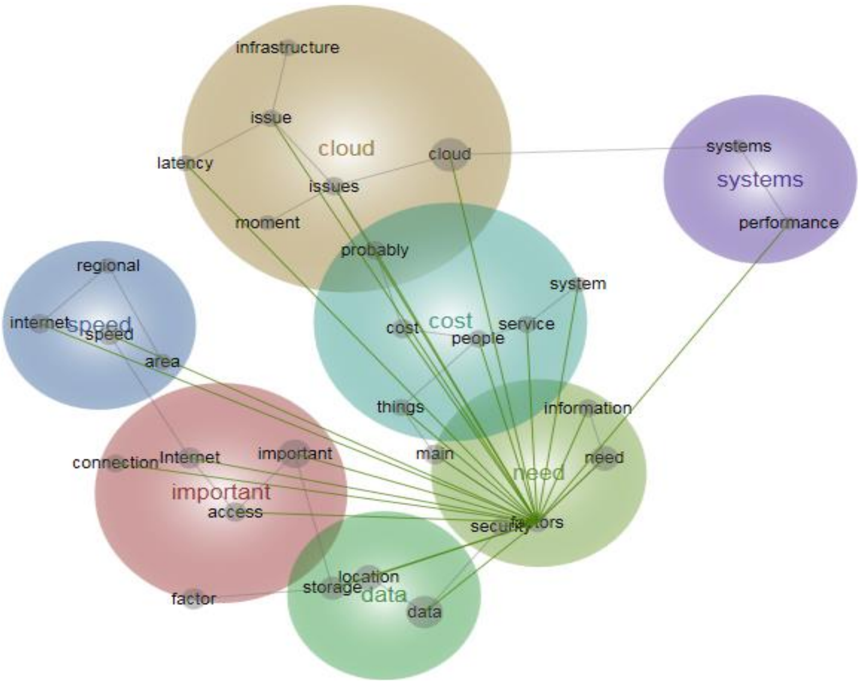


Figure 5.2: Factors and related linkages

When discussing the concept 'factors', the IT managers interviewed were referring to the factors of Internet, storage, cost, security, area, data and access. In relation to the concepts just mentioned, Table 5.2 illustrates the representative quotes for each concept.

Table 5.2: Considered factors concepts and themes

Leximancer-derived concepts	Representative quotes	Themes
Internet	"*In a technology perspective, Internet is the major factor you have to consider. Because a lot of the cloud providers are on the Internet, which means that you have to use your Internet connection*"	Important
Storage	"*Looking at the location of the servers, where that information going to be hold under specific policy, we need to inform people if we are going to store information off-shore in servers outside Australia*"	Data
Cost	"*One of the most important factors that need to consider is cost. We need to prove that CC is cost effective*"	Cost

Security	"*One of the main important factors that needs to be considered is security, making sure depending on the type of information that been going to held within the system and also determine what some of classification around the security need to be so, we will looking at things to make sure it is secure sites and it all data need to be encrypted between ourselves and the hosted party*"	Need
Area	"*For us, because we are in a remote location, our Internet connection, the reliability of it, is one of our main considerations because if we lose connectivity, we just do not have access to any of their applications*"	Speed
Data	"*For us, there are two main factors. One of them is the sovereignty of data so we need to ensure that our data is not stored in off shore data centres*"	Data
Access	"*Speed and access to the Internet are so important. These two factors belong to the communication infrastructure*"	Important

The analysis of the data found a number of aspects that were addressed by IT managers. These aspects included factors of Internet access, storage, cost, security, area, data and access. After having a comparison between the results from Leximancer and the manual analysis, it was found that both the methods gave nearly the same result in relation to the factors that need to be considered for CC adoption in ARMGs to take place.

5.4.2 Level of Policy for Cloud Computing Adoption

The second research issue investigated in the qualitative stage of the study is the level of policy for CC adoption in ARMGs. The level of policy identified by the participants based on their knowledge and experiences as IT specialists is presented in Table 5.3.

Table 5.3: Level of policy for cloud computing adoption

Level of policy	C7-RTS	C11-RAV	C15-RAL	C16-RAL	C18-URS	C19-RTL	C21-RTX	C25-RTM	C28-URS	C34-UFV	C39-URM	C40-UDV	C42-URL	C45-RAV	C52-UFM	C53-RTL	C55-URS	C61-URM	C68-URL	C72-URS	C74-RTM	Frequency	%
No specific policy on cloud adoption	●	●	●	●	●	●		●			●	●	●	●	●	●	●	●	●	●	●	18/21	86%
Policy focused on all risk factors		●			●					●	●		●	●	●			●				8/21	38%
Policy focused on privacy											●				●				●			3/21	14%
Policy focused on security										●		●										2/21	10%
Unsure of the current level of policy								●	●													2/21	10%

- **Lack of specific policy on adoption of cloud computing**

In this research, approximately 86 percent (18/21) of the sample agreed that there was a lack of specific policy on the adoption of CC. Participants commented that there was no national policy on CC adoption. Some participants mentioned that an IT committee in their organisation had been established to explore CC. Participants commented that:

> "*We do not have any formal policy in place here. As I said too, we do have an IT steering committee that is involved and they oversee these types of change*" (C15-RAL).

Although there are no specific and formal policies currently being implemented, participants still explained that it can be on a case-by-case basis for some organisations in terms of their employment of the cloud model.

> "*There is no policy limit. There are no policy prohibitions on cloud (computing) that I am aware of. As long as you can satisfy yourself that you are meeting your legislative obligations around data sovereignty, information privacy and so forth which you should reveal under any contract even if it is on shore*" (C68-URL).

- **Policy is present and focused on all risk factors**

Another level of policy observed was that regulations are focused on all risk factors. Approximately 38 percent (8/21) of the sample agreed that regulations were present and focused on all risk factors. Risk factors identified included the cost of the adoption, guarantee of quality service to clients and Internet speed.

> "*If we are going to upgrade their infrastructure, what we will do is, first of all, have a look if there is cloud solution. Then, we will evaluate the cost of either putting it on the cloud, I mean taking into consideration the issues that I have mentioned previously to ensure that the risk factors are minimised depending on the business critical of the system that we will be putting on the cloud. Next, we will make a decision. So, it will all come down to all the risk factors that I have mentioned before and pass the financial viability of it as well. So, that is the policy that we are adopting*" (C11-RAV).

- **Policy is present and focused on privacy**

The other level of policy need that emerged was a regulation targeted at the privacy of the data and the users. Approximately 14 percent (3/21) of the sample noted that the government has placed and implemented a policy securing the privacy of the stakeholders. Beyond privacy concerns, the next important policy consideration was whether or not the organisation had met the rules and regulation of the cloud model. Participants commented that:

> "*There is only the local government act and the privacy and those sort of acts that cover councils in general which none of them refer specifically to cloud, if anything sort of they impact on it, because present for the privacy in some way so we cannot push data offshore*" (C39-URM).

- **Policy is present and focused on security**

Approximately 10 percent (2/21) of the sample in this research reported there were rules for security of data and the stakeholders. Similar to the previous policy mentioned, this particular rule is aimed to protect the data uploaded or stored through cloud. Participants commented that:

> "*There is been some clarification about the level of data that can be, security level of data that the 'Feds' (federal government) will store offshore and state governments made some decisions there, but from a council perspective we are neither discouraged by senior, by policy or the other two levels of government, nor encouraged by the policy*" (C40-UDV).

- **Unsure of the current level of policy**

Approximately 10 percent (2/21) of the sample reported that they were not aware of any policy being implemented by their organisation in regard to CC technology. They commented:

> "*We do not know of any, or ever heard of policies or legislation here to say. Yes, it seems probably there are not any*" (C21-RTX).

5.4.2.1 Comparative analysis of the level of policy for cloud adoption

In this analysis, Leximancer clustered the concepts into seven themes (government, cloud, services, information, aware, down, sure), each theme aggregating two or more concepts and were represented by labelled circles as they have been illustrated in Figure 5.3. Figure 5.3 illustrates the IT managers' views relating to the level of policy for CC adoption in ARMGs. This figure depicts the central theme within the map as 'government' and is strongly linked to the themes: cloud, services, awareness and down time. The dominate theme 'government' has strong associations with most other concepts on the map. Government is multifaceted in its use: relating to councils, service, cost effective, stuff, strategy, data, and local. The concepts strategy, local, data, cost effective and service are shown to be frequently occurring and strongly connected to the theme of Government. Other themes illustrated but not connected to the theme of 'government' include: 'information' and 'sure'. The centrality of this theme provides a starting point for the research analysis.

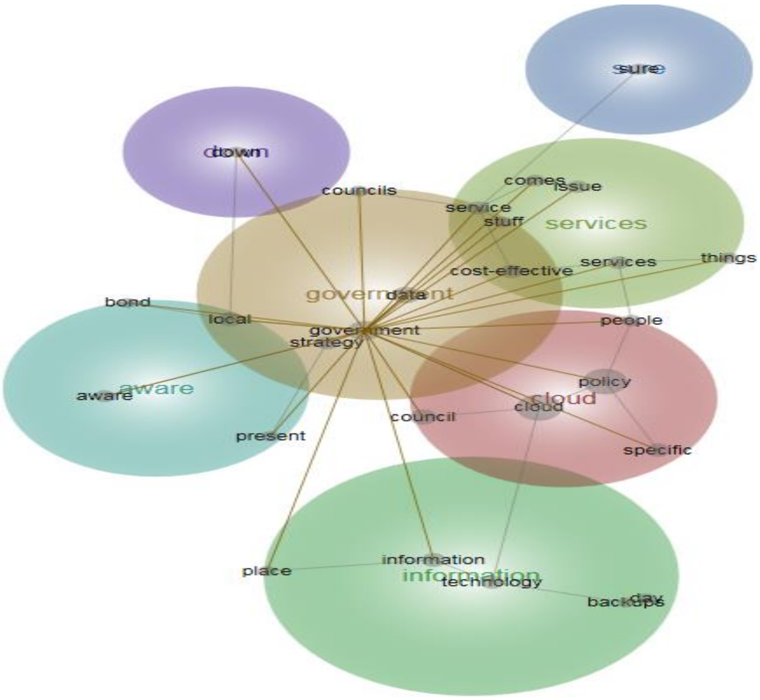


Figure 5.3: policy key concepts map

The theme of ‘cloud’, which contains the concept ‘policy’, links strongly to the findings within the MCA that suggested that IT managers saw the current level of policy on CC adoption as having an impact on their organisational unit. For more details see Figure 5.4.

The concept ‘policy’ and its linkages on the concept map, through the analysis, have been illustrated through Figure 5.4. This concept is linked to all other concepts on the map. These linkages are to be expected with ‘policy’ being the top ranking concept. The strongest linkages shown in Figure 5.4 are as follows: (a) between policy and specific, (b) between policy and stuff, (c) between policy and issues, (d) between policy and government, (e) between policy and data, (f) between policy and service, (g) between policy and council, (h) between policy and information, (i) between policy and cost effective, (j) between policy and people. These strengths are expected due to the focus of the research and the qualitative questions asked, which were related to the current policy for CC adoption.

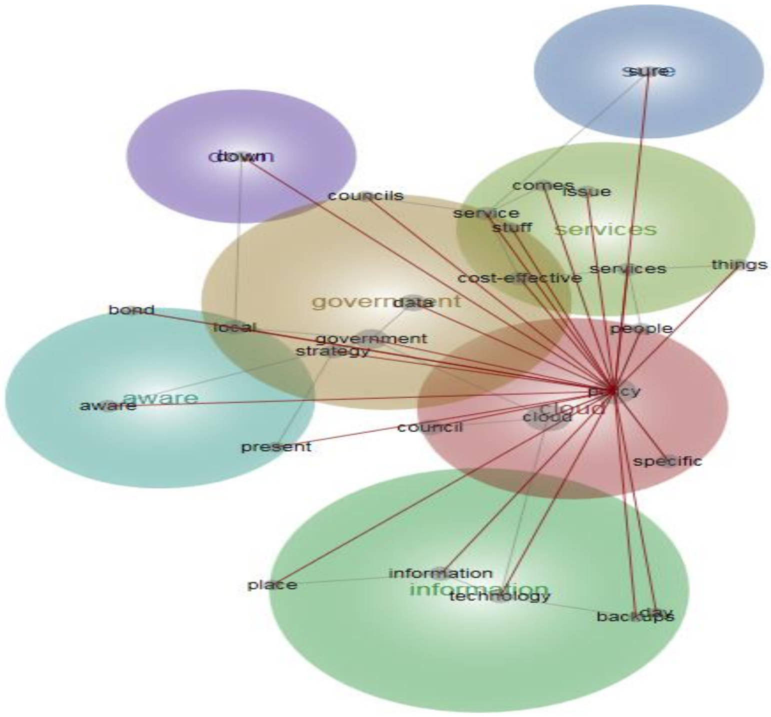


Figure 5.4: Policy and related linkages

When discussing the concept 'policy' the IT managers were referring to the impact of councils, government, strategy, specific, issues, information, cloud, awareness, and policy. In relation to the mentioned concepts Table 5.4 illustrate the representative quotes of each concept.

Table 5.4: Representative quotes of each concept

Leximancer-derived concepts	Representative quotes	Themes
Councils	"*There is not one that covers local government in general. Each council would have their own approach for policy and generally it won?*"	Government
Government	"*The other issue from the government perspective is also how you guarantee a service level when you are relying on the Internet. Because the internet, nobody really controls the internet*"	Government
Strategy	"*There is no policy, it might be more of a strategy which would be along the lines of what ways which is as opportunities arise, look at cloud-based solutions and if they are cost-effective to implement*"	Government
Specific	"*Basically, there is no specific policy that says we can or cannot do. It is done based on case by case at this stage*"	Cloud
Issue	"*Well the policy is, I mean, probably the major issue around the policy is around the storing of data off-shore*"	Services
Information	"*We do not have any formal policy in place here. However as I said to you before, we do have an IT steering committee that is involved and they oversight these types of change*"	Information
Cloud	"*At the moment it is more like an internal preference or internal work instruction there is no, well at our regional council anyway there is no adopted policy by council to*	Cloud

	move ICT infrastructure and services into the cloud it is more of a cost benefit analysis actually so it is rather than a dedicated policy"	
Aware	"*There are no policy prohibitions on cloud that I am aware of. As long as you can satisfy yourself that you are meeting your legislative obligations around data sovereignty, information privacy and so forth which you should reveal under any contract even if it is on shore*"	Aware
Policy	"*There is an impetus but not defined, written down black and white policy to move down that part. So, I supposed the answer would be, no, nothing formalized*"	Down

The analysis of the data found that the lack of policy was of concern to the IT managers, this included policy at the levels of councils, government, strategy, specific, issues, information, cloud, aware and policy. After having a comparison between the results from Leximancer and the manual analysis, it was found that both the methods gave the same result in a relation to the level of policy need for adoption of CC in ARMGs.

5.4.3 Significant anticipated Benefit of Cloud Computing Adoption

The third research issue investigated in the qualitative stage is the significant anticipated benefit of CC adoption. Some public sector organisations used CC as a services approach. Many government entities are accustomed to sharing data and resources and well positioned to take advantage of cloud infrastructures. Table 5.5 shows the breakdown of the anticipated benefit of the adoption of CC according to the analysis of participant responses. The anticipated benefits included: provide better services, cost reduction, reduce IT infrastructure, remote access, disaster recovery and backup, flexibility, availability, reduce staff, time efficiency, reduce level of risk and storage capacity.

Table 5.5: Anticipated benefits of cloud computing adoption

Anticipated benefit	C7-RTS	C11-RAV	C15-RAL	C16-RAL	C18-URS	C19-RTL	C21-RTX	C25-RTM	C28-URS	C34-UFV	C39-URM	C40-UDV	C42-URL	C45-RAV	C52-UFM	C53-RTL	C55-URS	C61-URM	C68-URL	C72-URS	C74-RTM	Frequency	%
Provide better services			●	●	●		●		●	●	●	●	●	●	●		●	●	●	●		15/21	71%
Cost reduction		●		●	●	●		●	●	●	●	●			●	●			●		●	13/21	62%
Reduce IT infrastructure		●	●	●		●				●		●	●	●		●	●			●	●	12/21	57%
Remote access				●	●				●	●		●			●			●	●			8/21	38%
Disaster recovery and backup		●			●	●								●				●		●	●	7/21	33%
Flexibility					●		●					●		●		●						5/21	24%
Availability					●		●				●				●					●		5/21	24%
Reduce staff		●								●	●				●				●			5/21	24%
Time efficiencies				●						●								●	●			4/21	19%
Reduce level of risk			●								●											2/21	10%
Storage capacity								●														1/21	5%

- **Provide better services**

This research found that providing better services to government stakeholders was the most cited benefit given by interviewees. Approximately 71 percent (15/21) of the sample identified this benefit. Three main benefits were given: reduced risks for the organisations, having access to data anytime and anywhere and better management of services.

The first benefit of reduced risk referred to improved data protection for the clients upon transition to the cloud model.

> "*The benefits of CC to the community directly is all about having a low risk with the data of the council and we are safe on the cloud base technology*" (C18-URS).

Next, participants pointed out that better service indicates that the staff and client may access their data and information anytime and anywhere.

> "O*ne of the greatest benefits of CC is the ability to access your data from anywhere and generally speaking in different devices as well*" (C21-RTX).

Finally, an overall enhanced service and management of data is promised and foreseen by the IT managers, given that the benefits of the cloud model will be maximised by the organisations and providers.

> "*We get the benefit of regular maintenance and update so we do not have an aging solution, maintaining currency can be an issue for council with the upgrades. And we suffer the service solution that all happens in the background of the main equipment. So that might be a benefit with the intensive functionality connected them previously*" (C52-UFM).

- **Cost reduction**

The second benefit of CC, as identified by the IT managers, was the expected cost reduction for the organisations, especially once the cloud model has been perfected and maximised. Around 62 percent (13/21) of the sample identified this as an advantage. Participants stated that cost reductions in operations through the use of CC were anticipated.

> "*The major benefits to move to a cloud is, obviously, is going to be cost savings because you do not have to invest in big data centres, in any infrastructure, in the people to maintain that infrastructure or support the infrastructure and maintain the infrastructure, well like upgrading and depreciating*" (C34-UFV).

They believe that CC will bring a reduced use of physical hardware systems, which will save that portion of financial resources for the organisations bottom line. Overall, participants had very similar views on how organisations will benefit by saving costs and managing their finances, which ensures productivity and sustainability in the long run.

> "*I would afford that the anticipated benefits would have been cost reductions. Cost reduction on providing those services. It will be cost saving of everything, support, hardware, software, the title cost effective taking into consideration*" (C11-RAV).

- **Reduce IT infrastructure**

This research showed that the reduction in IT infrastructures by each organisation was one of the significant benefits of the adoption of CC. This particular benefit is greatly connected to the reduced costs as discussed in the previous point.

> "*The major benefits to move to a cloud is, obviously, is going to be cost savings because you do not have to invest in big data centres or in any infrastructure*" (C34-UFV).

About 57 percent (12/21) of the sample believed that one advantage would be the decreased utilisation of IT infrastructure.

> "*The best benefits of adopting CC in the organisation is reduce IT infrastructure*" (C72-URS). "*If there were proper communication, then lesser needs for local infrastructure. No expensive service, local signs or backups; everything be done from the cloud. That would be an advantage*" (C74-RTM).

- **Remote access**

Remote access was another benefit reported by the IT managers' participants. Approximately 38 percent (8/21) of the sample identified remote access as anticipated benefit. The participants shared that by utilising CC, organisations will then have access to the remote and rural areas which may create greater advantages, especially having a larger audience reach.

> "*If you got the ability and some of small areas have this it is one major link in connection to the Internet so if one take out and then loss the connectivity to the Internet, become single point failure, so you are not able to run your business*" (C61-URM).

The participants noted that the ability to move the requirement for supporting the backend infrastructure that is required for some systems in regional areas and the need for those systems to be able to be supported by a data centre in the major cities, was a part of the agreement. There was less capacity in terms of locally-based skills, as there is a shortage of those skills within regional and rural areas, for them to be able to give and receive support.

> "*I guess one of the benefits is that to try and get the level of skilled IT workforce in remote and rural areas is significantly harder to get than in a capital city. So, I can see that there would be a benefit of CC to leverage off those issues with getting those skilled workers to those regions*" (C28-URS).

- **Disaster recovery and backup**

Approximately 33 percent (7/21) of the sample believed disaster recovery and backup facilities will be a positive effect of CC. Based on their responses, disaster recovery and backup entails to the ability of CC to function despite the unexpected issues and problems that may arise along the way.

> "*It would be beneficial for disaster recovery especially given the distance from any form of support especially if our roads and other mode of transport are being cut off for long periods of time especially with the flooding this way can be cut off for a fair while*" (C19-RTL).

> "*The ability of vendor to be able to look after the security side for things such as backup from disaster recovery from rural and regional area. Back to the supplier, who would carry them out and as a part of the agreement, we need to make sure that they have proper disaster recovery mechanism in place as far as backup and restore*" (C61-URM).

- **Flexibility**

Flexibility of access to data was another benefit anticipated by the participants. Approximately 24 percent (5/21) of the sample stated this benefit. Flexibility was mentioned as the first major benefit founded by this research wherein the stakeholders are given the opportunity to access their data anytime and anywhere. The participants commented:

> "*One of the greatest benefits of any CC is the ability to access your data from anywhere and generally speaking in different devices as well, so that you might be able to view something on a different device such as mobile phone and to be able to present, to perhaps you are away on at conferences or something like it, wanting to present something when you can access, you do not have to be logged in to the local server. You have got access anywhere and multiple people being able to share and work on the same documents for example. It gives you more flexibility in what you are doing*" (C21-RTX).

- **Availability**

Another benefit connected to flexibility is the availability of data. Approximately 24 percent (5/21) of the sample stated this benefit. Similar to 'flexibility', participants believe that the cloud model can provide an ease of use for the stakeholders once CC has been adopted. The participants who indicated this benefit commented that:

> "*Availability, it can be improved by having a probably architected and redundancy solutions and possibly speed too*" (C52-UFM).

- **Reduce staff**

Another benefit of CC adoption is the option to reduce staff within the organisation. Around 24 percent (5/21) of the sample anticipated this advantage. The participants who stated this shared that:

> "*The other benefits would be that you would not need certain specialised people internally as in, possibly, database administrators, possibly network administrators. That could possibly reduce some cost*" (C11-RAV).

The employment of reduced staff numbers may bring other advantages such as more highly organised management and cost reductions. The adoption of CC indicates that a reduced use of specialised people to maintain the organisation is needed since CC will then do much of the work upon adoption and transfer of data and information.

> "*The major benefits to move to a cloud is, obviously, is going to be cost savings because you do not have to invest in big data centres, infrastructure, and people to maintain that infrastructure or support the infrastructure and maintain the infrastructure, well like upgrading and depreciating*" (C34-UFV).

- **Time efficiencies**

Time efficiency is another important benefit that emerged upon the adoption of CC. Approximately 19 percent (4/21) of the sample anticipated this benefit. They shared:

> "*All the benefits come around being able to entering and use the SaaS and IaaS, that quick response bring the system quickly without spending much time or wait for service to arrive and installation of the processes*" (C61-URM).

Time efficiency and management is also anticipated by the IT managers. With CC all data and information is stored in one or organised sets of locations. Therefore time market will be a lot quicker and more effective.

> "*The other big benefit is the time it takes to actually provide the servicing and to get the actual system up and going. Because it is already set up in*

> *the cloud, you do not have to permit that in your own infrastructure, all you have to do really is put your data in there, you migrate your data in there and then train sort of chained management, so you actually do not have to do all the technology implementation side of it. So the time to market is a lot quicker*" (C34-UFV).

- **Reduce level of risk**

A reduced level of risk was foreseen by the IT managers. Approximately 10 percent (2/21) of the sample stated that CC could indicate a reduced level of risk. This can take effect as heightened protection and security is expected once the cloud model works effectively for the organisation and the stakeholders. The participants commented:

> "*Basically, by moving stuff in the cloud, the biggest benefit by far is that there is reduced…or the risk is moved away from council in that we do not have to deal with the risk as such*" (C15-RAL).

- **Storage capacity**

The last anticipated benefit that emerged from the qualitative stage was the storage capacity of data under the cloud model. Only 5 percent (1/21) of the sample anticipated this benefit. Due to the increase of the amount of the data, storage capacity becomes a problem of most of the organisations. A participant commented that:

> "*With the amount of data that we generate now, storage is becoming a problem and CC obviously can relieve that and relieve council of the financial burden to provide that*" (C25-RTM).

5.4.3.1 Comparative analysis of anticipated benefit of cloud adoption

In this analysis, Leximancer clustered the concepts into six themes (cloud, benefits, data, hardware, need, moment), each theme aggregating two or more concepts, represented by labelled circles as they have been illustrated in Figure 5.5. Figure 5.5 illustrates the IT managers' views of anticipated benefits of the adoption of CC in ARMGs. This figure depicts that the central theme within the map was 'cloud' and are strongly linked to the themes benefits, data and hardware. The dominant theme 'cloud' has strong associations with most other concepts on the map. Cloud is multifaceted in its use: relating to infrastructure, services, cost, systems, ability, rural regional, people, time, computing, and community. The concepts community, computing, benefits, cost, service, and infrastructure are shown to be frequently occurring and strongly connected to the theme cloud. Other themes illustrated but not connected to the theme 'cloud' include 'need' and 'moment'. The centrality of this theme provides a starting point for the research analysis.

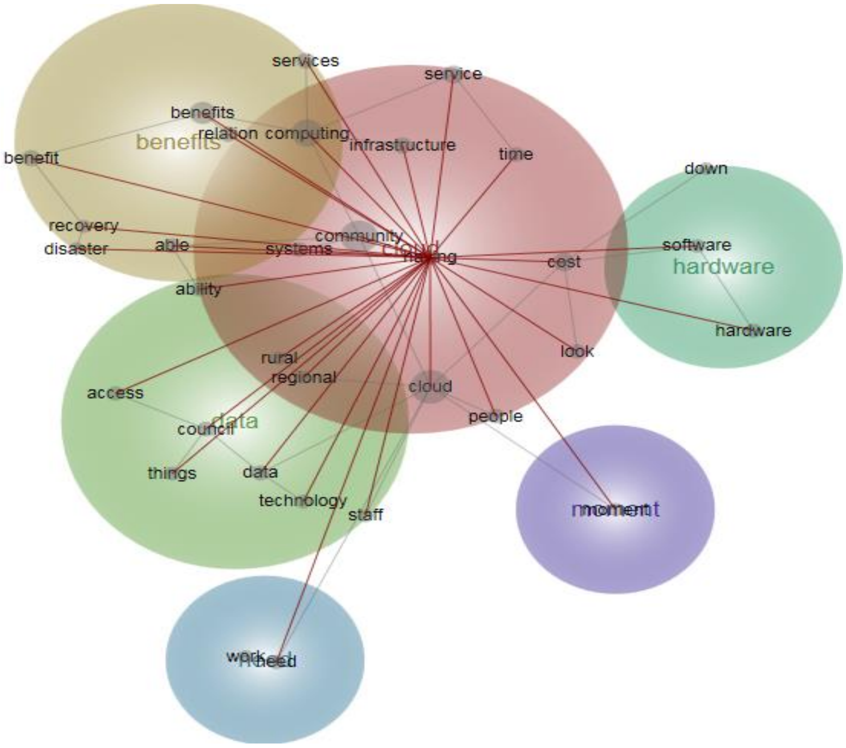


Figure 5.5: Anticipated benefit key concepts map

The theme of ‘benefits’ which contains the concept ‘benefit’, links strongly to the findings within the MCA that suggested IT managers saw CC as having anticipated benefits on their organisations. For more details see Figure 5.6.

The concept ‘benefit’ and it’s linkages on the concept map, have been illustrated through Figure 5.6. This concept is linked to all other concepts on the map. These linkages are to be expected with ‘benefit’ being the top ranking concept. The strongest linkages shown in Figure 5.6 are as follows: (a) between benefit and service, (b) between benefit and cost, (c) between benefit and disaster recovery, (d) between benefit and time, (e) between benefit and infrastructure. These strengths are expected due to the focus of the research and the qualitative questions asked, which were related to the anticipated benefits of CC adoption.

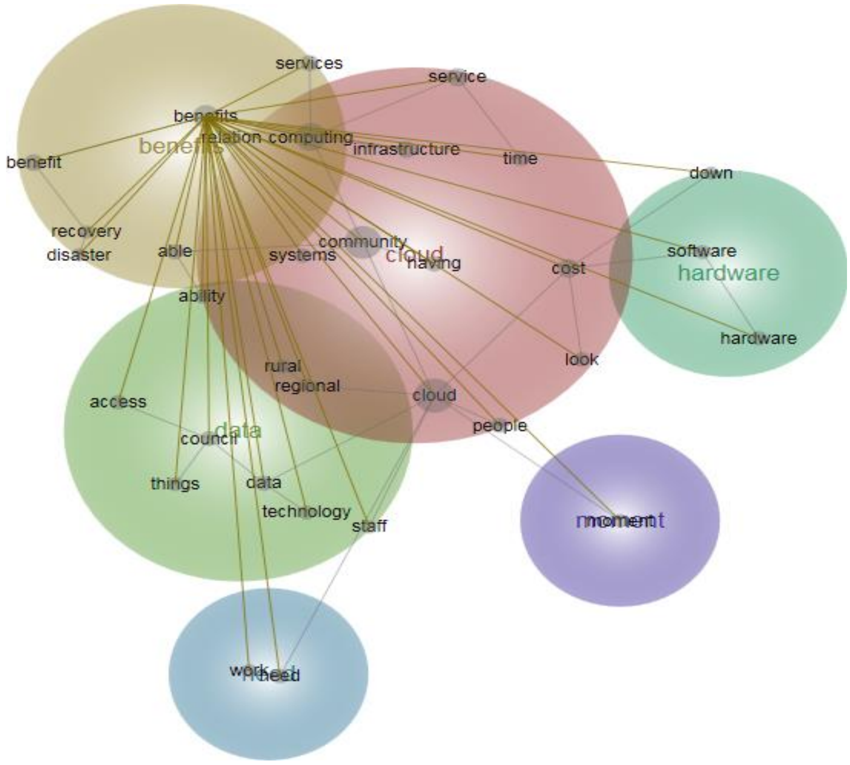


Figure 5.6: Anticipated benefits and related linkages

When discussing the concept ‘benefit’, the IT managers were referring to the benefits of cost, infrastructure, services, disaster recovery, ability, staff, time, rural regional, hardware, systems, software, and councils. In relation to the aforementioned concepts Table 5.6 illustrate the representative quotes of each concept.

Table 5.6: Anticipated benefits concepts and themes

Leximancer-derived concepts	Representative quotes	Themes
Cost	“*The major benefits to move to a cloud is going to be cost savings because you do not have to invest in big data centres, in any infrastructure, in the people to maintain that infrastructure or support the infrastructure*”	Cloud
Infrastructure	“*I supposed the primary one it would be the reduction in the requirement for local infrastructure*”	Cloud
Services	“*Ability to access services online. It would be one of the great benefits to the community*”	Benefits
Disaster recovery	“*It would be beneficial for disaster recovery especially given the distance from any form of support especially if our roads and other mode of transport are being cut off for long periods of time especially with the flooding this way can be cut off for a fair while*”	Benefits
Ability	“*One of the greatest benefits of any CC is the ability to access your data from anywhere and generally speaking in different devices as well*”	Data
Staff	“*The other benefits would be that you would not need certain specialized people internally as in, possibly, database administrators, possibly network administrators. Yeah, that could possibly reduce some costly*”	Data

Time	"*Whereas operating the expenditure is probably more accessible at times. The other big benefit too is the time it takes to actually provision the servicing and get the actual system up and going*"	Cloud
Rural areas	"*One of the benefits is that to try and get the level of skilled IT workforce in remote and rural areas is significantly harder to get than in a capital city so I can see that there would be a benefit of CC to leverage off those issues with getting those skilled workers to those regions*"	Data
Hardware	"*So we are no longer responsible to maintain or to pay for support into the hardware. But for software, there are still a lot of requirements*"	Hardware
Systems	"*According to the benefits of cloud to the community in general, small businesses have been able to utilise some of the features and functions around there. The small businesses can use online accounting systems such as; office 365, mail services, rather than having to run their own local mail service*"	Cloud
Software	"*All the benefits come around being able to entering and use the SaaS and IaaS, that quick response bring the system quickly without spending much time or wait for service to arrive and insulation of the processes*"	Hardware
Council	"*They can focus on the business of running a rural council rather than focus on the business of trying to run computer systems in a rural council*"	Data

The analysis of the data found a number of aspects that were addressed by IT managers. These aspects included benefits of cost, infrastructure, services, disaster recovery, ability, staff, time, rural, regional, hardware, systems, software and councils. After comparing the results from Leximancer and the manual analysis, it was found that both methods gave the same result in relation to the anticipated benefits of the adoption of CC in ARMGs.

5.4.4 The Challenges and Issues that Influence Cloud Computing Adoption

The fourth research issue investigated the qualitative stage and details the most important challenges and issues that influence the adoption of CC. Even though the adoption of CC has various benefits for the firm's performance, adoption has certain challenges and issues during the implementation and execution phases. This research presents in Table 5.7 the breakdown of the main challenges and issues as mentioned by the participants. The main challenges and issues included: effective network, security and loss control over data, data storage location, cost, availability of different providers, backup, privacy, integration, policy maker, lack of real understanding of cloud, trust and business transformation.

Table 5.7: Challenges and issues that influence the cloud adoption

Challenges and issues	C7-RTS	C11-RAV	C15-RAL	C16-RAL	C18-URS	C19-RTL	C21-RTX	C25-RTM	C28-URS	C34-UFV	C39-URM	C40-UDV	C42-URL	C45-RAV	C52-UFM	C53-RTL	C55-URS	C61-URM	C68-URL	C72-URS	C74-RTM	Frequency	%
Effective network	●	●	●	●	●	●	●	●	●	●		●	●	●	●			●		●	●	17/21	81%
Security and loss control over data	●	●	●	●			●	●	●	●	●			●		●	●					12/21	57%
Data storage location				●					●						●	●	●	●			●	7/21	33%
Cost			●			●			●			●						●	●	●		7/21	33%
Availability of different providers			●	●			●							●					●	●		6/21	29%
Backup			●		●				●			●				●					●	6/21	29%
Privacy		●					●				●			●				●				5/21	24%
Integration			●							●					●				●			4/21	19%
Policy makers								●				●	●				●					4/21	19%
Lack of real understanding of cloud						●				●			●			●						4/21	19%
Trust											●								●			2/21	10%
Business transformation						●						●										2/21	10%

- **Effective network**

Effective network is one of the significant issues that affect CC adoption in ARMGs. Approximately 81 percent (17/21) of the sample affirmed this issue. Not having good Internet connection, which can result to latency, is a crucial obstruction for the adoption of CC.

> "*Essentially, one of the top challenges that influence the adoption of CC is the Internet connection. Without good Internet connection CC is useless*" (C7-RTS).

Some participants noted that given their location, Internet connection was not readily available.

> "*The first challenge would be the reliability and availability of Internet connection. Because we are in remote area, we have not got the physical NBN connections*" (C11-RAV).

Other participants noted that having an effective network came hand-in-hand with higher costs and expenditures to obtain it.

> "*The most important issue in rural and regional areas is the Internet connectivity. The connectivity is the stable and the cost effective, that what we found when looking to the existing Internet connection and what we need to deliver some of our core systems through the cloud. The cost of getting sufficient Internet connection is quit high cost at this stage. I think this will be one of the big issues, the cost of the Internet connection*" (C61-URM).

- **Security and loss control over data**

Another crucial issue that emerged is the security and loss of control over data upon the adoption of CC. Approximately 57 percent (12/21) of the sample reported this as an issue. Participants explained that security could be considered a concern during the adoption as the loss of control over data can significantly bring greater problems to the organisation.

> "*Security is a big thing it comes back to the control. If we are in control we know what security we have got, and who to trust. To push that at someone else as a service then we need to make sure we have a good relationship with the supplier so they can establish the level of trust. The security, that is just a technical sort of things that would come back to uses anyway that the lowest point of security*" (C39-URM).

Others described how data security is the biggest issue for the adoption of CC especially in regional areas. Participants had apprehensions given how security can become an immense issue once data control is lost and not properly managed by the providers and organisations.

> "*In relation to the security of CC, do we trust the cloud provider to store that data? Now, I suppose challenges, I suppose making sure that your provider is reputable*" (C45-RAV).

- **Data storage location**

Another foreseen issue of CC adoption of the cloud model is the location of the data storage. Approximately 33 percent (7/21) of the sample stated that the data storage location could potentially be an issue. This is because of the lack of clarity between the providers and vendors with the placement of data.

> "*Looking at the location of the servers, where that information going to be holds under specific policy, we need to inform people if we are going to store information off-shore in servers outside the country*" (C61-URM).

- **Cost**

The cost of the full adoption of CC is a potential barrier most especially for the smaller and less exposed organisations. Approximately 33 percent (7/21) of the sample indicated the total expense that organisations may need to disburse in order to afford the transition to the cloud model. Participants noted the risk of the high amount of capital funds needed for CC which then brings higher pressure and demands for the organisations.

> "*As large amounts of capital funds become harder to get as this done with pressure on resourcing or particularly in regional areas that might have difficulty attracting IT staff to their employment. IT is a service particularly soft gross of service and number forms of outsourcing become attractive. We get to spread our cost over a multiple years and we get to move the risks and problem of staffing and resourcing out to our provider so they are the main benefits for small and regional organisations*" (C68-URL).

Some participants reported that, there were no figures that justify CC as being cost effective.

> "*The cost is one of the significant challenges and needs to be justified. Because we have not seen any figures that proved or justified CC as cost effective*" (C11-RAV).

- **Availability of different providers**

Another important issue that emerged was the availability of different providers. Approximately 29 percent (6/21) of the sample described this issue as a hindrance for fully adopting the cloud model. There would be one provider that would be providing their business grade data solutions and data network solutions. The availability of different providers will give organisations the chance to select the provider who will provide the highest quality of services.

> "*We have only got one vendor we can go to. We cannot - I know Noosa, for instance, being in South East Queensland there is a lot more resources available to them and they have got two different networking vendors they use to... they have got the redundancy built into their network. We cannot do that here, we need to be convinced that the network is solid*" (C16-RAL).

The IT managers discussed the difficulty of choosing the right provider for an organisation as trust is needed for quality service to be perceived. The availability of more than one provider will result in a more competitive market and will hopefully result in high quality services and reduced costs.

> "*Because there would be one vendor that would be providing the services. I think the service cost at the moment is fairly high*" (C15-RAL).

- **Backup of data**

Backup emerged as an important issue. Approximately 29 percent (6/21) of the sample indicated backup to be a problem when considering the adoption of CC. The presence of a backup is a concern for participants as backups ensure the organisations of protection and defence once unexpected events or incidents take place.

> "*If they can guarantee that they have a backup solution, they have got policies and procedures in place, so if there is a catastrophic failure, we will be backup and running within a decent time frame and none of the data get lost. Because we would be losing hundred thousand dollars a year*" (C74-RTM).

- **Privacy**

Another difficulty for the adoption of CC is the issue of privacy of the data being uploaded and stored on the cloud model. Approximately 24 percent (5/21) of the sample described how privacy can affect the adoption of CC. Privacy is connected to the security issues. The danger of uploading all important and guarded data on the cloud can cause discomfort for organisations.

> "*Another challenges related to the privacy concern where the data will be stored and if have privacy role in those particular organisation where the data been housed, some people worry about the privacy and where the data housed and this comes as a risk*" (C61-URM).

- **Integration**

Integration of data and software was reported as an issue by approximately 19 percent (4/21) of the research sample. The risk of the data programs and software not working appropriately and matching, as the cloud model requires, is a potential cause of failure for the adoption of CC.

> *"One of the major challenges is integration. Integration is to some extent easier when we are hosting all of our main systems within our own data centre. But, if we move to a software service model and they are being host to 4 different continents then some of our application integration and application performance complexities might change" (C68-URL).*

- **Policy makers**

Policy makers surfaced to be a risk for approximately 19 percent (4/21) of the research sample. These participants explained how policy makers could become hindrances in the adoption of CC, especially by having the wrong perceptions and lack of proper understanding of the new technology. The participant commented that:

> "*Policy makers are going to get caught up in the hype of CC rather than being analytical about CC and yeah, determining what is best and what is not best, so the policy makers will dictate to the ICT infrastructure caretakers about direction. I think that is a risk because you know every other council is doing it so it must be good so we should do it too rather than analysing our maybe unique and particular circumstances and making a proper assessment*" (C42-URL).

- **Lack of real understanding of cloud**

Lack of real understanding of the cloud emerged as a slightly lesser issue than the policy makers. Approximately 19 percent (4/21) of the sample highlighted how the lack of proper orientation and awareness of the new technology could lead to the failure of adoption.

> "*The biggest risk is understanding and clarity of what the actual concepts are in CC*" (C53-RTL).

Another participant indicated that the top management staff who make the decision to adopt CC can have limited knowledge on the topic.

> "*They suggest that the cloud is a great thing and there should not be any fears of moving there and it is very cost effective. But they do not really have an understanding of the factors. They do not understand what it is*" (C15-RAL).

Many people in top management do not come from an IT background and do not have not any experience or knowledge in relation to CC:

> "*Top management do not know what to do and so they do not do anything to improve the adoption of any new technology*" (C15-RAL).

- **Trust**

Another issue that emerged was the concept of trust. This concept has continually and constantly appeared throughout the analysis of the whole data. Approximately 10 percent (2/21) of the sample explained that trust is a requirement, given the amount of crucial and significant information uploaded on the cloud by organisations. Organisational data under the control of CSPs created a risk of data leakage that posed a barrier against the trusting of this type of technology.

> "*Related to the trust issue, I think in regard to if we are going to be adopting a cloud provider and we are going to put all of our capsule data in there. I am sure that cloud provider is going to be utilizing their data centres for other organisations and storing data for not just local governments or state governments. They probably storing it for commercial companies as well so there is definitely a risk there in regard to security of that data or whether or not that cloud provider is secure enough from possible attacks and hacks and that sort of thing so I guess by keeping our data in house then we take that responsibility and we take our own issue for our data*" (C28-URS).

- **Business transformation**

The last important challenge that was established from this research analysis is business transformation. Approximately 10 percent (2/21) of the sample stated that business transformation is one of the issues that faced cloud adoption. Business transformation as a risk pertains to the willingness of stakeholders to accept the new process of doing things. This challenge was posted as business transformation and is not always readily and easily accepted by government organisations and society especially traditional ones.

> "*Business transformation is another one that I would see a bigger issue if how do we actually change the business to accept this new way of doing business*" (C40-UDV).

5.4.4.1 Comparative analysis of challenges and issues on cloud adoption

In this analysis, Leximancer clustered the concepts into six themes (security, cloud, data, connection, network, access), with each theme aggregating two or more concepts and are represented by labelled circles as they have been illustrated in Figure 5.7. Figure 5.7 illustrates the IT managers' views about challenges and issues that influence the adoption of CC in ARMGs. This figure depicts the central theme within the map as ‘security’ and was strongly linked to the themes ‘cloud’ and ‘data’. The dominant theme ‘security’ has strong associations with most other concepts on the map. Security is multifaceted in its use: relating to provider, service, level, issue, and risk. The concepts privacy, level, people, provider, issue, and risk are shown to be frequently occurring and strongly connected to the theme security. Other themes illustrated but not connected to the theme ‘security’ include ‘network’, ‘connection’ and ‘access’. The centrality of this theme provides a starting point for the research analysis.

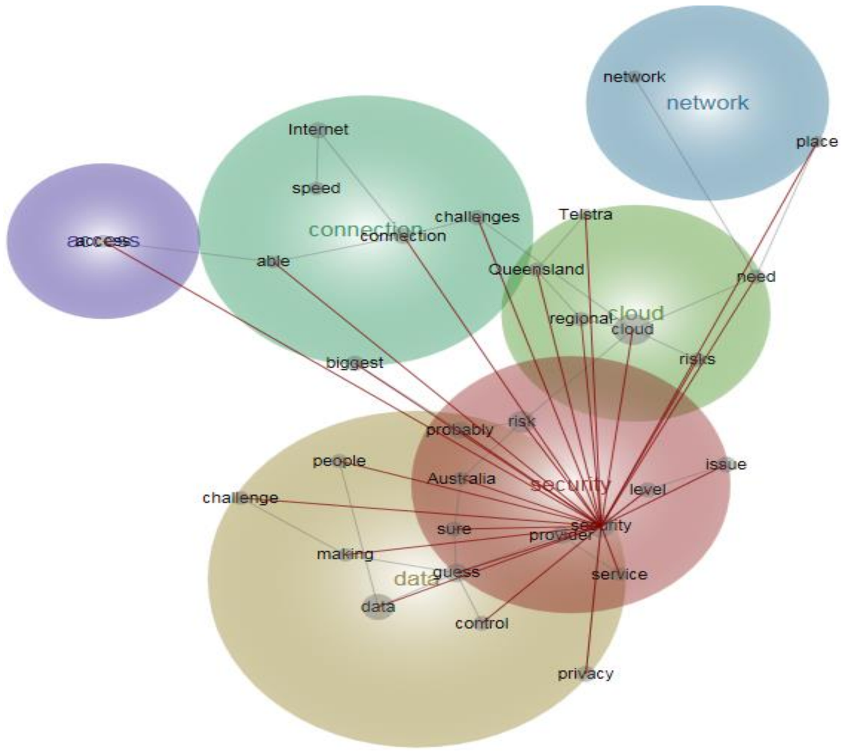


Figure 5.7: Challenges and issues key concepts map

The theme of ‘data’ which contains the concept ‘challenge’ and the theme ‘security’ which contains the concept ‘issue’, linked strongly to the findings within the MCA that suggested IT managers saw these as challenges and issues of CC technology within their organisational unit. For more details see Figure 5.8.

The concepts ‘challenge’ and ‘issue’ and their linkages on the concept map, through the analysis, have been illustrated by Figure 5.8. These concepts are linked to most of the concepts on the map. These linkages are to be expected with ‘challenge’ and ‘issue’ being the top ranking concept. The strongest linkages related to the challenges shown in Figure 5.8 are as follows: between (a) between challenge and service, (b) between challenge and control, (c) between challenge and speed, (d) between challenge and access. Also, the strongest linkages related to the issues shown in Figure 5.8 are as follows: (a) between issue and provider, (b) between issue and security, (c) between issue and network, (d) between issue and privacy.

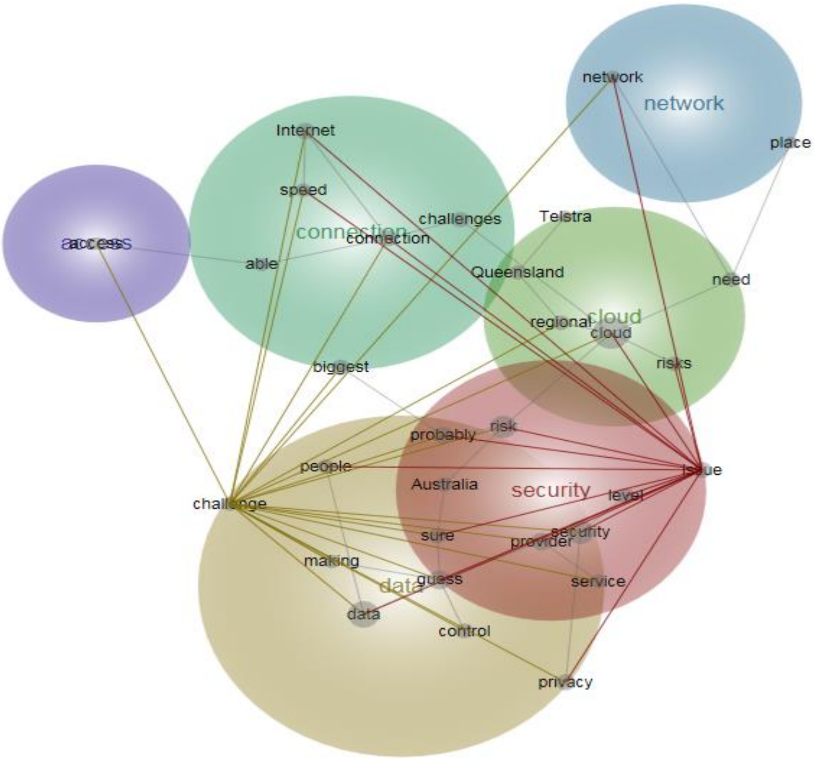


Figure 5.8: Challenges and issues concepts

All these strengths are expected due to the focus of the research and the qualitative questions asked; which were related to the challenges and issues that influencing the adoption of CC.

When discussing the concepts ‘challenge’ and ‘issue’, the IT managers were referring to the impact of security, provider, network, speed, data, connection, cloud, control, and regional. In relation to the mentioned concepts Table 5.8 illustrate the representative quotes of each concept.

Table 5.8: Challenges and issues concepts and themes

Leximancer-derived concepts	Representative quotes	Themes
Security	*“The other big issue of course is the risk of a security exposure. By having your information up in a third party provider”*	Security
Provider	*“We have only got one vendor we can go to. We cannot - I know Noosa, for instance, being in South east Queensland there is a lot more resources available to them and they have got two different networking vendors they use to... So, they have got the redundancy built into*	Security

	their network. We cannot do that here. So, we need to be convinced that the network is solid"	
Network	"*The other big issue is the latency. So with the network you have bandwidth and latency*"	Network
Speed	"*You got to qualify or assess which applications are best suited for the cloud. And in doing that assessment, you got to take in consideration the speed of the Internet because the Internet speed is one issue because you are using the Internet to get to the cloud; you are not using your own private network anymore*"	Connection
Data	"*It depends on the type and the importance of data we are talking about and the level of privacy requirement for it*"	Data
Connection	"*The first challenge would be the reliability and availability of speed and Internet connection. Because we are in remote area, we have not got the physical NBN connections here yet*"	Connection
Cloud	"*Specifically for local government I think integration of cloud solution can be a challenge*"	Cloud
Control	"*The top challenge is that, the change in how we do business. It is an in control of certain data and never format that private to someone else as a service provider so losing control of your data is a risk and it is also a challenge to accept that in some regard*"	Data
Regional	"*Major challenge is the provision of competitive network data access in rural and regional areas. Cost of network access and data is prohibitive*"	Cloud

The analysis of the data found a number of aspects that addressed by IT managers. These aspects included challenge and issue of provider, security, network, privacy, service, control, speed, and access. After having a comparison between the results from Leximancer and the manual analysis, it was found that both the methods gave the same result in a relation to challenges and issues that influencing the adoption of CC in ARMGs.

5.4.5 Discussion of Critical Drivers of Cloud Computing Adoption

This section provides a discussion about critical drivers of cloud computing adoption and this include: factors to be considered in cloud computing adoption, level of policy for cloud computing adoption, anticipated benefits of cloud computing adoption, and challenges and issues that faced the adoption of cloud computing.

5.4.5.1 Factors to be considered in the adoption of cloud computing

The main factors stated by the participants based on their knowledge and experiences as IT managers included; Internet connectivity including (Internet speed, reliability, availability), data storage location including (security, data sovereignty), cost, integration, data backup, provider dependability, employees' knowledge, and transportability.

Internet connectivity. Internet connectivity was identified as the most elementary issue to address when talking about IT/IS adoption. Internet connectivity is defined in terms of certain factors, such as accessibility and availability, which determine the ability of the internet to meet a satisfactory level of service (Magele, 2005). Any organisation planning to adopt CC must ensure reliable and stable Internet connectivity (Tweneboah-Koduah, 2012). There appears to be a dearth of studies that have been conducted to assess the interrelationship between Internet connectivity and the adoption of CC. However, these research findings strongly confirmed that Internet connectivity is one of the significant factors required to be consider for CC adoption. Approximately 90 percent of the sample agreed that Internet connectivity influenced their adoption and there were two main reasons provided: (1) Many councils located in rural and regional areas do not have access to a high-speed Internet. (2) Internet connectivity in rural and regional areas is expensive. The participants also identified other factors that affected Internet connectivity. These factors included Internet speed, availability, and reliability.

- ***Internet speed***. CC can be delivered through increasingly available high-speed broadband (Voorsluys et al., 2011). With high-speed Internet connectivity this technology can be adopted to support organisations in improving their productivity. The research strongly confirmed the findings in the literature review that stated Internet speed is one of the significant factors related to Internet connectivity. Approximately 81 percent of the sample confirmed that, Internet speed influenced their adoption. They reported that without high Internet speed, the adoption of CC is impractical.
- ***Reliability***. For business solutions it is very important that CSPs be consistent and accessible to support 24/7 operations (Voorsluys et al., 2011). Different features and requirements related to reliability must be considered when choosing a CSP and the negotiated terms must be made part of the SLA (Voorsluys et al., 2011). This research strongly confirmed that the concept of reliability has emerged as an important factor related to the Internet connectivity in CC adoption. This factor was addressed and confirmed by approximately 43 percent of the sample. The participants reported that, CC would not be as effective if the dependability of the connection for CC is not proven and not as strong as it should be.

- ***Availability***. Refers to the uptime of a system, a network of systems and hardware and software that collectively provide a service during its usage (Ahuja & Mani, 2012). Technically there are several levels where availability can be achieved. These levels include application level, data centre level and infrastructure level (Rackspace, 2010). All necessity that related to the availability of the service need to be considered when selecting a CSP (Ahuja & Mani, 2012). It is important to make sure that CSPs offer environments that are highly scalable and high in availability (Ahuja & Mani, 2012). In this research availability of the services within CC was addressed by approximately 43 percent of the sample. The participants said that without the availability required, the advantages that CC promises to provide will not eventuate.

Data storage location. As CC becomes more widely implemented, there is a wide range of policy issues related to data storage locations that require considerable attention (Jaeger et al., 2008). These include issues of privacy, security, communications capacity and government surveillance (Delaney & Vara, 2007; Ma, 2007). There has been a lack of policy development related to the storage of data in CC (Jaeger et al., 2008). CC raises a range of important policy issues in relation to data storage location. This research confirmed prior research findings that data storage location is one of the significant factors required to be considered for CC adoption. Approximately 71 percent of the sample stated that this was an important factor, as sometimes data is stored off-shore and it is essential to know the location and details of the off-shore storage systems, arrangements for maintenance and identification of the parties involved. Furthermore, there are some issues related to data storage location such as security, and data sovereignty.

- ***Security.*** This type of issue has by far been the primary reason for public authorisation of CC (Joshi et al., 2001; Paquette et al., 2010; Wyld, 2010). Governments need to ensure the security for citizen data and ensure availability of critical infrastructure (Curran et al., 2011; Joshi et al., 2001). Protection of citizen data has also been identified in studies as the main concern of the government organisations when adopting CC (Duffany, 2012; Gharehchopogh & Hashemi, 2012). Analysis carried out by the Department of Economic and Scientific Policy of the European Union showed that approximately 63 percent of government CIO had security reservations when endorsing CC publicly (Tweneboah-Koduah et al., 2014). Another assessment conducted by the KPMG (2012) also identified security concerns as the major obstacle in the public adoption of CC throughout Europe, America and the Asia Pacific (Herhalt & Cochrane, 2012). Data security risks arising from CC include: (1) data confidentiality due to the concentration of data on a common cloud infrastructure; (2) loss of control over data by the organisation using the cloud services; and (3) amenability of authentication and transmission stages to data interception (Tweneboah-Koduah et al., 2014).

This research indicates that security of data is one of the significant factors, in relation to data storage location, that required consideration for CC adoption. Approximately 38 percent of the sample stated various reasons for why they believe that the security of data should be considered before transferring to and completely adopting, CC technology. The IT managers were concerned with the external factors that may negatively affect the storage systems and unauthorised access of data. Other participants who were concerned with security wanted to store their data within the country to ensure better protection for organisations and their stakeholders. This was seen as a way of reducing the risks of security breaches and similar risks.

- ***Data sovereignty*.** The fact that many organisations have their storage servers distributed across different countries and out of reach of their jurisdictions, heightened concerns about data sovereignty (Tweneboah-Koduah et al., 2014). Regardless of whether CSPs are located on or offshore, an assurance is required by governments that their sovereignty would not be threatened by the overriding effect of laws extant in the jurisdiction of the CSPs' application or data storage (Tweneboah-Koduah et al., 2014). This research found that maintaining sovereignty over the data was identified as an important factor to be considered in transitioning to CC technology. Approximately 19 percent of the sample saw data sovereignty as a significant factor that needed to be addressed. Participants wanted to ensure that their data, rights and sovereignty were protected under Australian government laws.

***Cost*.** Hardware and associated administrative costs need to be accurately estimated by businesses to determine how they can remain economically viable and feasible (Forell et al., 2011; Li et al., 2009). Such economic feasibility can be assessed by applying costing models (Dillon et al., 2010; Ramgovind et al., 2010). The organisations wanting to implement CC need to compare the cost of transferring to the cloud as opposed to continuing with the hardware systems (Cardoso & Simões, 2012; Greenberg et al., 2009). These costing should include cost items relating to transferring the remote business aspects to the cloud, increasing bandwidth to increase efficiency and ensuring feasibility (Kim, 2009; Kondo et al., 2009). This research shows that cost is one of the significant factors required to be considered for CC adoption. Approximately 52 percent of the sample stated that it is essential to consider the cost as a factor in adoption of CC. The sample said that, there were no known figures to justify CC as a cost effective solution.

***Integration*.** Lack of integration between networks makes it difficult for organisations to combine their IT systems with CC and realise the gains from the technology (Tweneboah-Koduah et al., 2014; Tripathi & Parihar, 2011). Organisations need to automatically provision services, manage virtual machine instances and work with both cloud-based and enterprise-based applications using a single tool set, which can function across existing programs and multiple CSPs (Brohi & Bamiah, 2011). In this research, the integration of systems, applications and software was another major concern. Approximately 33 percent of the sample described how integration could affect the adoption of CC and had very similar concerns. These participants considered integration to be a very important factor as the software and other systems would not perform appropriately if the organisations cannot integrate them precisely.

***Data backup*.** There is no assurance of data backup in CC (Hemant et al., 2011). Recovery of data from the cloud is critical for businesses in the case of failure. The CSPs in turn might rely on seamless backups to enforce resilience of their infrastructure. Since these backups might be done without the customer's active informed consent, it could lead to serious security issues and threats. One of the top threats identified by CSA (2010) is data loss or 'leakage', where records may be deleted without a backup of the original content. From a larger context, a record might be unlinked, or the data stored on an unreliable media could be effectively destroyed in the event of key management failure. It is the sole responsibility of CSPs to protect the delicate enterprise data by constantly backing up data to ensure quick recovery.

Approximately 19 percent of the sample was concerned about the protection or backup available to them in case of unexpected issues.

Provider dependability. A new finding that was not covered in the literature was provider dependability. Provider dependability is the degree of trust that is given to a provider to control the organisation's data. This research found that provider dependability is a significant factor that is required to be considered for the adoption of CC. Approximately 19 percent of the sample pointed out that there is a very high risk in relation to the trust that is given to CSPs to control an organisation's data. The trust that is given to CSPs has potential to result in the loss of control over the data.

Employees' knowledge. According to Roger (2003) the employee's adoption behaviour can be affected by the accumulated experience of using new innovations. In the case of CC, familiarity with technologies such as virtualisation, cluster computing or utility computing can have a direct influence upon employee perceptions regarding CC services. Several studies have found prior experience to be important in technology adoption decisions (Bandura, 1977; Igbaria et al., 1995; Kuan & Chau, 2001; Lippert & Forman, 2005). Consequently, prior experience could be expected to play a facilitative role in the adoption decision. This research shows that employees' knowledge is one of the factors required to be considered for CC adoption. Approximately 14 percent of the sample explained how the employees adopting CC should have enough skills and knowledge to manage the new technology that they are utilising to provide a quality service to their stakeholders.

Transportability. Another new finding that was not covered in the literature was transportability. Transportability is the capability and flexibility of the equipment, systems and associated hardware that permits them being moved from one location to another to interconnect with locally available complementary equipment, systems, associated hardware, or other complementary facilities. This research found that transportability is an important factor to be considered for CC adoption. Approximately 10 percent of the sample stated that, this factor can be closely connected to the availability of data backups. Furthermore, the participant explained that in order to have data backup, transportability of data should be available and accessed.

5.4.5.2 Level of policy for cloud computing adoption

With the ability to energetically organise, grant and redesign servers to attend to an assortment of requirements, CC is defined as a computing podium. Meanwhile, policy issues based on CC are not being extensively conversed or recognised. Conversely, CC is escalating swiftly as a utility used worldwide by numerous organisations and many individuals. According to Jaeger et al. (2008), as CC is being utilised far and wide, there has been a decline of policy creation in regard to the adoption of CC, as there is an extensive range of problems concerning CC that require substantial concentration. Some researchers such as Delaney and Vara (2007); and Ma (2007) shed light on the range of policy issues that comprises of government inspection, confidentiality, communication aptitude and defence problems. On the subject of the stipulation and expansion of CC, in relation to the aforementioned problems, there are noteworthy ambiguities about and apprehensions between industrial capability and public policy (Jaeger et al., 2008).

This research investigated the current level of policy for CC adoption in ARMGs. The first finding in this research was that no specific policy on the adoption of CC exists and approximately 86 percent of the sample agreed. Some noted that there was no national policy on CC, others mentioned that there is an IT committee that has been established to explore CC. Although there are no specific and formal policies currently being implemented, participants still explained that it can be a case to case basis for some organisations and their employment of the cloud model.

The second finding related to the level of policy that emerged which focused on all risk factors. Approximately 38 percent of the sample stated that regulations are present and focused on all risk factors. Risk factors identified included the cost of the adoption, guarantee of quality service to the clients and internet speed.

The third finding was regulation that targeted on the privacy of both the data and the users. Approximately 14 percent of the sample observed that the government has implemented a policy securing the privacy of the stakeholders.

The fourth finding was regulation targeted on the security of the data and the stakeholders. Approximately 10 percent of the sample in this research reported that there were rules for security of data and the stakeholders. Similar to the previous point mentioned, this particular rule is aimed to protect the data uploaded or stored through CC.

The final finding was the unsureness of the current level of policy. Approximately 10 percent of the sample agreed that they were not aware of any policy being implemented by their organisation in regard to CC technology. These participants reported that they were not aware of any legislation pertaining to CC in local government.

As CC becomes a widespread platform, it is likely to increase issues concerning the level of policy surrounding CC. According to Singh et al. (2006), it will be essential to locate technology and policy elucidations for adopting guidance that will guarantee confidentiality and information precautions to certify the adoption and escalation of CC. There is an obligation to expand policies, rules or directives to envelop CC adoption that will prove cooperative in cataloguing the ambiguities and apprehensions of contributors and associations regarding CC. Furthermore, on the basis of the outcome of this segment, the above mentioned is suggested by the study. The lack of supervision acts as a hindrance for the development of CC user execution, combined with the existing deficiency of policies.

Instruction by an elected neighbourhood, state and national regime division or constitution authorising better accuracy in service accords amid the contributors and associations are the two methods that can be taken under deliberation both individually or concomitantly, based on the prior discussion. As stated by Best et al. (2008); Jaeger (2007); and Carrico and Smalldon (2004) that for the subsequent purposes, either of these methods would have the objective of ensuring the acknowledged principles of CC.

- Fundamental thresholds for authenticity
- Obligation of accountability for failure or other infringement of the data
- Opportunities for information sanctuary
- Confidentiality protection
- Any possible prospects for secrecy
- Admittance and consumption privileges
- International equivalence to encourage trans-border information streaming in clouds.

Through directives or formation of constraints on upcoming service accords, the particular rudiments of the abovementioned principles can be recognised. These issues will be chief elements to forge user confidence in CC and deal with the policy issues related to it regardless of which method is assumed.

5.4.5.3 Significant anticipated benefits of cloud adoption

The main anticipated benefit identified by the participants based on their knowledge and experiences as IT managers included: provide better services, cost reduction, reduced IT infrastructure, remote access, disaster recovery and backup, flexibility, availability, reduce staff, saving time, reduce level of risk, and storage capacity.

***Providing better services*.** CC and its benefits have attracted strong interest amongst various public sector organisations (Saeed et al., 2011). Through employing the CC system, government organisations and various public authorities can relatively focus more on the core objectives of their business, instead of contemplating on IT resource provision and maintaining IT tasks (Saeed et al., 2011). By providing government organisation services online, for example, the organisation can improve the quality of service in subject to be timelier, richer in content and with greater availability **(**Goel et al., 2012; Hashemi et al., 2013; Rastogi, 2010). In this research, providing better services to the stakeholders of organisations was the most significant benefit stated by the majority of the IT managers interviewed. Approximately 71 percent of the sample perceived the supposed benefit. Many benefits of CC technology were identified, such as: improved data protection for the clients upon transition to the cloud model. Staff and clients access their data and information anytime and anywhere. An overall enhanced service and management of data is promised and foreseen by the IT managers given that the benefits of the CC model.

***Cost reduction*.** The interest in CC derives from the anticipated benefits (LGAQ, 2013), it offers low starting expenses (Saeed et al., 2011; Saini et al., 2011; Miller, 2008). This financial benefit is expected mainly due to the usage-based pricing model. Start-up organisations in particular can use CC to help them decrease their capital expenses (Grossman & Gu, 2009). CC provides almost direct access to shared computing resources and new and small businesses alike can launch new operations quickly with little to no upfront capital investment; this will assist with a faster time to market in many businesses (Lanman et al., 2011; Marston et al., 2011). Using software from the cloud will lead to a reasonable reduction in systems maintenance and updating requirements (West, 2011). In this research, cost reduction was the second anticipated benefit of CC as perceived by the IT managers with approximately 62 percent of the sample supporting the perceived benefit. Participants believe that CC will bring a reduced use of physical hardware systems, which will save a large portion of the financial resources used by the organisations. Participants had very similar views on how organisations will benefit by saving costs and managing their finances, which ensures productivity and sustainability in the long run.

Reduce IT infrastructure. It is evident that there are several benefits to CC and one of the prime benefits of this advanced computing technology, particularly with regard to the government organisations services, is minimizing the IT infrastructure (Das et al., 2011). There is no other IT costs in regards to infrastructure, programming and support resources advancement (Beaubouef, 2011; Sperling, 2010). In this research, reduce IT infrastructure was another benefit noted by the IT managers within the sample. This particular benefit is greatly connected to the benefit of reduced costs as discussed in the previous section. Approximately 57 percent (12/21) of the sample believed that one benefit would be the decreased utilisation of IT infrastructure.

Remote access. Remote access is a new finding and also one of the significant benefits that were reported by the IT managers within the sample. Based on the extant literature there appears to be a dearth of studies that have been conducted to assess remote access and its anticipated benefits of the adoption of CC. Approximately 38 percent of the sample provided remote access as an anticipated benefit. The participants stated that by utilising CC, organisations will gain access to remote and rural areas, which can result in greater advantages, especially a larger audience reach.

Disaster recovery and backup. Disaster recovery provisions are essential for the endurance and long-term existence of many firms. Disaster recovery provisions ensure firms hold the capability to survive any complications caused by their IT infrastructure. Disaster recuperation schemes within cloud systems provide more choices compared to traditional disaster recuperation programmes, in order to restore the data in a prompt and swift manner (Rajkumar et al., 2011). With regard to this recovery type, the overall cost and time taken can be reduced (Staten, 2011). Governments can maintain a backup of the server through employing cloud system as an efficient backup for their disaster recovery on a day-to-day basis and can store it off-site through implementing a third party storage service provider that holds the ability to store in a different location (Hashemi et al., 2013). In this research, disaster recovery and backup of data were other benefits predicted by the participants. Approximately 33 percent of the sample believed that disaster recovery and backup will have a positive effect on CC. Based on the samples responses, disaster recovery and backup is thought to entail the ability of CC to function despite the unexpected issues and problems that may arise along the way. Having proper data backup can provide a quick recovery during times of unexpected data access crises.

***Flexibility and availability*.** Perceived complexity of the technology seriously hinders the increase in adoption rates and user satisfaction. In CC, the operating interfaces of cloud applications look like browser web based applications or windows based applications. Both interfaces tend to be intuitive and easy to use (Greer, 2009). Most CC suppliers offer more flexible contract terms, which encourages firms to implement cloud services as needed, to expand their businesses (Leavitt, 2009). In addition to these significant characteristics of CC, there is the portability and accessibility feature, as the Internet is considered the backbone of the utilisation idea, through which computing services are provided for clients through an active Internet connection. On-demand access to any application can be at any time from any location, provided the client has network access (Lanman et al., 2011). This can assist small businesses, which have a wide market and broad horizontal company operations, such as regional or international, to decrease external costs and make them less location dependent. In this research, flexibility and availability of data access were additional benefits anticipated by the sample participants. Approximately 24 percent of the sample stated these benefits. Flexibility and availability were mentioned in the first major benefits list, founded by this research, wherein the stakeholders are given the opportunity to access their data anytime and anywhere. Participants believe that the cloud model can provide an ease of use for the stakeholders once CC has been adopted.

***Reduce staff*.** According to study conducted by West (2011) one of the most important benefits of the adoption of CC is reduce IT infrastructure. As a result of reduced IT infrastructure most of the IT software, operations and functions are done by a third party. Furthermore, there will be fewer in-house IT staff and lower costs. On the other hand, some studies found that CC does not remove the necessity for IT branch staff, on the grounds that clients still oblige access to the Internet and application configuration. CC permits IT administrators to focus on core business functions. As with any ICT operation, potential CC adopters must be vigilant in testing their IT foundation and operations (Lenart, 2011). This research, confirmed that reduced staff is one of the anticipated benefits of CC adoption. On the other hand, the employment of a reduced number of staff may bring other benefits such as better organised management structures and cost reductions. The adoption of CC indicates that a reduced number of specialist people needed to maintain the organisation would be needed since CC will then do much of the work on the adoption and transfer of data and information. Approximately 24 percent of the sample anticipated this benefit.

Time efficiencies. Another new finding that was not covered in the literature was time efficiencies. This research found that saving time was a new important benefit that emerged upon the adoption of CC. Approximately 19 percent of the sample anticipated this benefit. Time efficiency and management is anticipated by the IT managers. With CC all data and information is then stored in one or more sets of locations, therefore time market will be a lot quicker and more effective.

***Reduced level of risk*.** Another new finding that was not covered in the literature was reduced the level of risk. This research found that reducing the level of risk was a new and important benefit that emerged upon the adoption of CC. Approximately 10 percent of the sample stated that CC can indicate a reduced level of risk. This can take effect as heightened protection and security is also expected once the cloud model is working effectively for the organisation and the stakeholders.

***Storage capacity*.** Capacity includes increased computing power, improved performance, unlimited storage capacity, increased data safety and fewer maintenance issues (Miller, 2008). Many organisations fully utilise less than half of their total ICT resource capacity (Leavitt, 2009) and most computing suppliers try to focus on the idea of offering computing services to their clients where they can scale up their capacity on demand (Grossman & Gu, 2009). Whenever the client needs additional computing resources such as storage space, the provider can simply increase the provision accordingly in order to handle their increased business needs. In this research, storage capacity was the last anticipated benefit that emerged from the qualitative research stage. Due the increase in the amount of data, storage capacity became a problem for most of the organisations surveyed. Approximately 5 percent of the sample anticipated this benefit.

5.4.5.4 Challenges and issues that influence the cloud computing adoption

The main challenges and issues facing the adoption of CC in local councils, identified by participants based on their knowledge and experiences as IT managers included, effective network, security and loss control over data, data storage location, cost, availability of different providers, backup, privacy, integration, policy makers, lack of real understanding of cloud computing, trust and business transformation.

Effective network. An efficient government cloud service system should be highly responsive, economical and user-friendly (Liu & Wassell, 2011; Vats et al., 2012). CC can potentially overcome challenges of remoteness (Lee & Crespi, 2010). Any organisation planning to adopt cloud must ensure reliable and stable Internet connectivity (Tweneboah-Koduah, 2012). This research strongly confirmed the findings in the literature review that effective network is one of the significant issues that affects CC adoption. Approximately 81 percent of the sample affirmed this issue. Not having quality Internet connection, which can result in latency, is a crucial obstruction for the adoption of CC. Some participants noted that given their location, Internet connection is not readily available and this is a serious issue for their organisation once they adopt CC. This issue pertained to the reality that an effective network could make or break the output and success of CC for an organisation. Other participants connected the issue of having an effective network to another hindrance of having higher costs and expenditures upon obtaining an adequate Internet connection.

Security and loss control over data. There are concerns over security and loss of control over data with processing or relocating potential databases into the cloud (Gharehchopogh & Hashemi, 2012; Duffany, 2012). A survey by IDC in 2008 rated security and loss of control over data as the top challenge in the adoption of the cloud model (Kuyoro et al., 2011). The security challenges exist at the network, host and application level (Pearson & Benameur, 2010). The main issues relate to defining which parties are responsible for which aspects of security. Such division of responsibility is hampered by the lack of standardisation of cloud APIs, data control loss, unauthorised collection and usage of data and the CSP not adequately protecting data (Chandrareddy et al., 2012; Hamlen et al., 2010). This research confirms that security and data control loss are crucial issues that emerged upon the adoption of CC. Approximately 57 percent of the sample reported this as an issue. Participants explained that security could be considered a concern during the adoption as the loss of data control can significantly contribute to greater problems to the organisation. Others described how data security is the biggest issue for CC especially in regional areas. Participants had apprehensions about how security can become an immense issue once data control is lost and not properly managed by the providers and organisations.

Data storage location. According to Jaeger et al. (2008), as CC is being utilised far and wide, there has been a decline in policy creation, in regard to the adoption of CC, as there is an extensive range of problems concerning CC that require substantial concentration. Some researchers such as Delaney and Vara (2007); and Ma (2007) shed light on the range of policy issues that comprises of government inspection, confidentiality, communication aptitude and defence. On the subject of the stipulation and expansion of CC, in relation to the aforementioned problems, there are noteworthy ambiguities about and apprehensions between industrial capability and public policy (Jaeger et al., 2008). There appear to be a dearth of studies that have been conducted to assess the data storage location with the challenges and issues that faced the adoption of CC. This research confirms that data storage location is another foreseen issue upon the adoption of the cloud model. Approximately 33 percent of the sample population stated that data storage location could potentially be an issue, primarily due to the lack of clarity between the providers and vendors with the placement of data.

Cost. According to the literature review, the best cost benefit that CC has as contrasted with different innovations is that it offers low start-up expenses (Saeed et al., 2011; Saini et al., 2011), one of the major benefits that organisations expect from using cloud services is cost savings (Miller, 2008). For start-up organisations, using cloud services can help them to decrease their capital expenses and hurdles to business start-up (Grossman & Gu, 2009). CC provides almost direct access to shared computing resources and small and start-up businesses can launch new operations quickly with little to no upfront capital investment, assisting with a faster time to market in many businesses (Marston et al., 2011). This research found that while cost benefits might ultimately flow from the adoption of CC, the start-up cost hindered organisations from fully adopting it. This finding was especially related to the smaller and less exposed organisations. Approximately 33 percent of the sample made note of the total expense that organisations may need to disburse in order to afford the transition to the cloud model. Participants noted the risk in the high amount of capital funds needed for CC which then brings higher pressure and demands for the organisations. Some participants reported that there were no figures that justify CC as being cost effective.

***Availability of different providers*.** One new finding that was not covered in the literature was the issue of availability of different providers. This research found that the availability of different providers was a new and important issue that emerged upon the adoption of CC. Approximately 29 percent of the sample described this issue as a hindrance into fully adopting the cloud model. There would be only one provider that would be sharing their business grade data solutions and data network solutions. The availability of different providers will offer an opportunity to organisations to select a provider who will deliver the most appropriate level of service required by each organisation. The IT managers discussed the difficulty of choosing the right provider for an organisation as trust is needed for quality service to be achieved. The availability of more than one provider will make services more competitive and hopefully these providers will offer high quality services and drive the cost of these services down.

***Backup of data*.** There is not any surety of data backup in CC (Hemant et al., 2011; Wang & Mu, 2011; Wyld, 2010). Recovery of data from cloud is critical for businesses in the case of failure. The cloud providers in turn might rely on seamless backups to enforce resilience of their infrastructure. Since these backups might be done without the customer's active informed consent, it could lead to serious security issues and threats. One of the top threats identified by CSA (2010) is data loss or leakage', whereby records may be deleted without a backup of the original content. From a larger context, a record might be unlinked, or the data stored on an unreliable media and could be effectively destroyed in the event of a key management failure. This research confirms that backup is emerging as an important issue facing the adoption of CC. Approximately 29 percent of the sample indicated backup to be a problem when considering the adoption of CC. The presence of a backup procedure is a concern for participants as backups ensure the organisations of protection and defence once unexpected events or incidents take place.

***Privacy*.** The risk to privacy is perceived in terms of services that deal with different aspects of data including: collecting, transferring, processing, sharing or storing, in relation to personal information. Risk to privacy warrants adequate measurement for protecting privacy with regard to those services dealing with highly sensitive information, especially, information relating to location, preferences, social networks of individuals and personal health data (Alshomrani & Qamar, 2013; Yadav & Singh, 2012). Although public cloud is the most preferred economically viable architecture, it poses a threat to privacy as customer data is handled and managed by the CSP (Pearson & Benameur, 2010). According to previous studies, there are a number of aspects that best illustrate privacy issues in public cloud such as: lack of user control; unauthorised secondary usage; trans-border data flow and data proliferation (Alshomrani & Qamar, 2013; Yadav & Singh, 2012; Pearson & Benameur, 2010). This research confirms that the privacy of data being uploaded and stored on the cloud model was an important issue that faced the adoption of CC. Approximately 24 percent of the sample described how privacy can affect the adoption of CC. Furthermore, the danger of uploading all important and guarded data on the cloud can cause discomfort for organisations.

***Integration*.** Cloud services can be much more than applications and other ICT services (Tripathi & Parihar, 2011). The supremacy of IT encompasses data association across applications and messages that are conveyed in various systems to provide prompt and swift services to the end users. The Cloud system is developed on the Simple Object Access Protocol (SOAP) principles and can provide solutions to incorporate various applications and applications can be seamlessly switched over to the cloud system (Hashemi et al., 2013; Rastogi, 2010; Tripathi & Parihar, 2011). This research found that integration of data and software is seen as one of the major issues that faced the adoption of CC by 19 percent of the sample. The risk of the data programs and software not being able to work properly and match, as the cloud computing model requires, is a potential cause of failure for CC adoption.

Policy makers. Another new finding that was not covered in the literature was the influence of policy makers. This research found that the influence of policy makers is a new and important issue that emerged upon the adoption of CC. Approximately 19 percent of the sample described this issue as a barrier to the adoption of the cloud model. A participant explained how policy makers have potential to become hindrances in the adoption of CC, especially if they have the wrong perceptions and lack proper understanding of the new technology when developing CC polices.

Lack of real understanding of the cloud. Another new finding that was not covered in the literature was the lack of a real understanding of CC. This research found that the lack of understanding of the cloud system is a new and important issue that emerged upon the adoption of CC. Approximately 19 percent of the sample highlighted how the lack of proper orientation and awareness of the new technology could lead to the failure of CC adoption. Other participants indicated that top management, who make the decision to adopt cloud, had limited knowledge on the concept. Also, top management members do not always come from an IT background and subsequently do not have much experience or knowledge relating to CC and its adoption.

Trust. One of the major key concerns, particularly with regard to finance and health data, is the higher need for data privacy and security attached to the vendor offerings(Pearson & Benameur, 2010), as both finance and health sectors deal with confidential and sensitive information (Behl, 2011; Ramgovind et al., 2010; Pearson, 2009; Julisch & Hall, 2010; Jensen et al., 2009). Thus, the associated vulnerability of the CC system is the key business inhibitor in such sectors. These domains need control against unauthorised or secondary access or any kind of misuse and currently CC systems do not allow such customer control. Some sectors such as finance and health rely on mechanisms, such as insurance, court action, or penalties, which provide compensation in case of a breach of SLAs (Verma & Kaushal, 2011; Ramgovind et al., 2010; Weinhardt et al., 2009). This research confirmed that the concept of trust emerged as an important issue for the adoption of CC. This concept has continually appeared throughout the analysis of the data as a whole. Approximately 10 percent of the sample explained that trust is needed, given the amount of crucial and significant information uploaded on to the Cloud by organisations. Organisational data being under the control of CSP created a risk of data leakage that posed a barrier against trusting this type of technology.

Business transformation. Based on the literature review, there appears to be a lack of studies conducted to assess business transformation after the adoption of CC. This research found that business transformation was one of the important issues that faced the adoption of CC. Business transformation as a risk pertains to the willingness of the stakeholders to accept the new processes resulting from CC adoption. This challenge was posted as business transformation is not always readily and easily accepted by governments and society in general, especially the more traditional ones.

5.4.6 Conclusion of Critical Drivers of Cloud Computing Adoption

Within the section 'critical drivers of CC adoption' the research presented the four major themes and several minor themes to ensure that the findings were valid and reliable to evaluate CC adoption in ARMGs. It was then established that, the major factors to be considered in the adoption of CC in ARMGs were: internet connectivity including (Internet speed, reliability and availability); data storage location including (security and data sovereignty); cost; integration; data backup; provider dependability; employees' knowledge and transportability. The research findings confirmed the findings of the literature review, such as reliability; availability; security; data sovereignty; cost; integration; data backup; and employees; knowledge. Conversely, there appeared to be a dearth of studies that have been conducted to assess factors such as Internet connectivity; Internet speed and data storage location. The research findings resulted in new factors to consider in CC adoption, such as; provider dependability and transportability.

The most significant findings of this research related to the current level of policy for adoption of CC in ARMGs were find that there are no specific policies that govern whether or how to adopt CC at present. There were some policies that were located and they focused on risk factors such as; cost and quality of service) and some other policies concentrated on the realm of security and privacy.

The findings of this research related to the anticipated benefits of CC in ARMGs were: provide better services; cost reduction; reduce IT infrastructure; remote access; disaster recovery and backup; flexibility; availability; reduce staff; saving time; reduce level of risk; and storage capacity. The research findings aligned with the literature review in regards to the anticipated benefits of CC adoption such as; provide better services; cost reduction; reduce IT infrastructure; disaster recovery and backup; flexibility; availability and storage capacity. Alternatively, there appears to be a dearth of studies that have been conducted to assess some anticipated benefits such as reduced staff requirements. The research findings come with some new anticipated benefit from cloud adoption. These new anticipated benefit are remote access; saving operation time; and reduce level of risk.

The findings of this research related to the challenges and issues that influence the adoption of CC in ARMGs were: effective network; security and loss of control over data; data storage location; cost; availability of different providers; backup of data; privacy; integration; policy makers; lack of real understanding of cloud; trust and business transformation. The research findings aligned with the literature review in regards to some of the important challenges and issues that influence CC adoption such as; security and loss of control over data; cost; backup of data; privacy; integration and trust. However, there appear to be a dearth of studies conducted to assess some challenges and issues such as effective network; data storage location and business transformation. Furthermore, the research findings presented some new challenges and issues that influence CC adoption. These new challenges and issues are: availability of different providers; policy maker and lack of real understanding of cloud.

5.5 Proposed Research Model Factors

This research analysed the efficiency, validity and reliability of the cloud model using the interviews of the participants to evaluate if CC adoption in ARMGs is perceived to be successful. Furthermore, this research used different factors to distinguish the impact of the technology innovation adoption.

5.5.1 The Impact of the Innovations Characteristics on Cloud Adoption

The findings suggest that the innovation characteristics of CC such as; compatibility and complexity all had a positive impact. Compatibility had a positive impact based on 76 percent of the sample population. Complexity had a positive impact with 57 percent of the sample population. Table 5.9 shows the findings of the impact of the innovation characteristics.

Table 5.9: Impact of the innovation characteristics

Factors	Impact	Frequency	%	Reasons
Compatibility	Positive	16	76%	• CC is easily compatible with the existing IT infrastructure. • Positive impact as the positive effects outweighs the negative compatibility outcomes.
	Negative	2	10%	• Negative impact as compatibility is not present in regional councils. • Negative impact as compatibility can bring risks in the organisation's environment.
	Not sure	3	14%	• Not sure as technology is still evolving and the impact is indistinct.
Complexity	Positive	12	57%	• Positive impact as complexity of CC less than the other technologies.
	Negative	5	24%	• Negative impact as a lot of issues is still needed to be resolved when it comes to complexity.
	Not sure	4	19%	• Not sure as technology is still evolving and the impact is indistinct.

- **Compatibility**

The impact of compatibility on CC adoption was found to be positive. Two reasons were provided:

1. CC is easily compatible with the existing IT infrastructure.

> "*Compatibility, if things were compatible with what we are running, it will have a positive impact. I think there is no problem with this factor, because it is based on the CSPs and most of the CSPs find solution to this factor*" (C19-RTL).

2. The positive effects outweigh the negative compatibility outcomes. This indicates that the IT managers viewed the effects of compatibility to be far more significant than the unconstructive outcomes anticipated.

> "*We do not see any more complex than what we currently have now. Because we are only taking that application and that server functionality and it is just running off-site. The only link in between them is the connectivity so we do not see the complex of it being any different except that the server is maintained by another party, not your internal network and database administrator. So, for compatibility we think it has positive impact to the adoption of CC*" (C11-RAV).

Some participants commented that compatibility had a negative impact, two reasons were provided:

1. Compatibility is currently not present in regional councils.

> "*Compatibility, in a relation to the telecommunication infrastructure that we have some regional council, I think we cannot have compatibility with*

> *the advanced technology like cloud. So, I think will be negative*" (C25-RTM).

2. Compatibility can bring risks in the organisation's environment.

> "*Compatibility within a complex integrated environment becomes a real risk for organisations like us*" (C68-URL).

Others who were unsure if compatibility could have a positive or a negative impact to CC comments' included that compatibility is still evolving and the impact is indistinct.

> "*At this stage, it is neither a positive nor negative. What happen in the future, if technology improves, so then it improves? But we cannot say having at least the next few years*" (C7-RTS).

- **Complexity**

The impact of complexity on CC adoption was found to be positive. One reason was provided:

1. Complexity of CC is less than the other technologies.

> "*About the complexity, comparing to other type of technologies CC is less complex. We do not see any more complex than what we currently have right now*" (C55-URS).

Some participants believed that complexity could result in more negative impacts. They reported that, complexity has a negative impact as a lot of issues are still required to be resolved, especially when it comes to the complexity of the cloud model.

> "*Complexity of CC is generally more complexity. We are outsourcing to people who have generally better resources than we would otherwise have*" (C21-RTX).

Others were unsure of what degree of complexity is related to CC technology. They stated that the cloud model is still too complex to be fully understood. It was suggested that participants were not sure as technology is still evolving and the impact of the complexity is still indistinct.

> "*About complexity, I am just going off what I am aware of at the moment I would probably say it would be probably much more complex or less complex than it is at the moment it is definitely going to be less requirement to having an understanding of your servers*" (C19-RTL).

5.5.2 The Impact of the Technological Factors on Cloud Adoption

This research suggests that the technological factors of CC such as cost and security concerns are perceived to have a positive impact, upon analysis of the responses of the participants interviewed. Cost was seen to have a positive impact by 76 percent of the sample population. Security concern was believed to have a positive impact with 57 percent of the sample population. Table 5.10, illustrated the exploratory stage findings on the impact of the technological factors.

Table 5.10: Impact of the technological factors

Factors	Impact	Frequency	%	Reasons
Cost	Positive	16	76%	• Positive impact as CC is cost effective and can helping the organisations' saving financially. • Positive impact if the cost reductions can be proven and justified.
	Negative	3	14%	• Negative impact as it is costly to completely adopt and transfer to CC.
	Not sure	2	10%	• Not sure as there are still a lot to be proven and tested with regard to CC.
Security concern	Positive	12	57%	• Positive impact as security is not really an issue with CC at present. • Positive impact as CC will provide a more protective environment.
	Negative	4	19%	• Negative impact if CC still sharing infrastructure with others.
	Not sure	5	24%	• Not sure as there are still a lot to be proven and tested with regard to CC security.

- **Cost**

The impact on the cost of CC adoption was found to be positive. Two reasons were provided:

1. CC is cost effective and can help the organisations save financially.

> "*It is a positive effect because cost has definitely gone down. Most of the councils at the moment are finances stretched, so we do not have to spend money on infrastructure to purchase the servers and other related equipment and we just pay monthly or yearly charge to our IT Company. So, that is a positive thing*" (C18-URS).

2. Positive impact if the cost reductions can be proven and justified.

> "*The cost reduction needs to be justified. If proved that CC is cost saving that means it will positive to adopt it*" (C11-RAV).

The majority of the IT managers believed that although cost is considered as a risk factor, it could still have a positive impact, especially once other elements have been settled and sustained for the benefit of the organisation in the long term.

Some participants believed that the cost of the cloud model could potentially result in a negative impact. Participants explained that there would be a negative impact, as it is costly to completely adopt and transfer to CC.

> "*The cost is negative at the moment unless you are starting up from new. If you already have hardware, procedures, and software in place then it is*

> *negative because you have to change and give up what you have got. So, that all depends on your situation you are in*" (C39-URM).

Others were uncertain if the cost would result in a positive or a negative outcome for the organisations under the cloud model. The participants emphasised that they were unsure given that there is still a lot to be proven and tested with regard to CC.

> "*I would probably just think if it is positive or negative, it just takes that time to work through, I mean, I guess the cost and all of those issues have resolutions and I guess for an organisation like mine, I think a lot of times you know, internally, counsellors and certainly management would be happy to adopt the new technology like cloud tomorrow*" (C16-RAL).

- **Security concern**

The impact of security concern on CC adoption was still positive. Two reasons were provided:

1. Positive impact as a security concern was not really an issue with CC at present.

> "*We would have the same security on our database externally as with what we have internally we do not see that as a major issue because we adopt the same models. Also, it depends on the CSP we go with*" (C39-URM).

2. Positive impact as CC will provide a more protective environment.

> "*I think security in the cloud will probably be, will most likely be stronger than security in the house in most case. So, I think moving to the cloud would be a more secure environment than what we are currently in*" (C40-UDV).

However, some participants believed that the security of the cloud model could result to a negative impact. Participants explained that there would be a negative impact, as the cloud still shares infrastructure with others.

> "*Security is still a concern because if we are in a virtual private cloud, we are still using the same data centre as other organisations are, so we are still using the underlined physical hardware but we have got our own virtual private cloud. So, that is, could be, the security could be a concern because we are sharing infrastructure with other customers*" (C34-UFV).

Others were unsure of the impact of CC on the security of data and the system. These participants were uncertain as there is still a lot to be proven and tested with regard to CC.

> "*In relation to the security of CC we still not sure about it. We need to make more research to make sure that CC is more secure than the other technologies*" (C53-RTL).

5.5.3 The Impact of the Organisational Factors on Cloud Adoption

This research suggests that the organisational factors of CC adoption such as top management support, organisation size and employees' knowledge, all have a positive impact, upon analysis of the responses of the participants interviewed. Top management support was perceived to have a positive impact by 67 percent of the sample population. Organisation size was another factor that had a positive impact with 71 percent of the sample population. The last organisational factor is employee knowledge and it was believed to have a positive impact with 90 percent of the sample population. Table 5.11, illustrated the exploratory stage findings of the impact of the organisational factors.

Table 5.11: Impact of the organisational factors

Factors	Impact	Frequency	%	Reasons
Top Management Support	Positive	14	67%	• Positive impact if CC is supported by the top management as it will provide better services.
	Negative	4	19%	• Negative impacts as there are no real and proven benefits for top management at the moment. • Negative impact as top management lacks real understanding for CC. • Negative impact as top management is more concerned with the budget of the adoption.
	Not sure	3	14%	• Not sure as there is still a lack of understanding from the top management with regard to CC.
Organisation size	Positive	15	71%	• Positive impact especially for the smaller organisations as they are more flexible in adopting the new technology. • Positive impact as the organisation can capitalize on CC. • Positive impact especially for the bigger organisations as they have the resources for CC adoption.
	Negative	3	14%	• Negative impact as there are no real and proven benefits for the organisation size at the moment.
	Not sure	3	14%	**3.** Not sure as the impact would depend on the organisation size or not.
Employees' knowledge	Positive	19	90%	• Positive impact if employees' knowledge is full and 100% understanding CC. • Positive impact as employees' knowledge and skills will be increased.
	Negative	1	5%	• Negative impact as there is no real and proven benefits for the employees' knowledge at the moment.
	Not sure	1	5%	**4.** Not sure with how employees' knowledge is related to CC.

- **Top management support**

The impact of top management support on CC adoption was positive. One reason was provided:

1. Positive impact if the adoption of CC is supported by top management as it will provide better services. They believed that top management support would create a positive impact on the adoption of CC as they are mostly the decision makers of the organisations, to say the least top management has the final say if the adoption of the cloud model can be done or not.

> "*Top management support has a positive effect on this one because all our councillors and our top CEO Managers agree that moving to cloud base will increase the council performance and will help the council to provide good services to our customers*" (C18-URS).

Participants highlighted the negative effects or influences that they foresee with regard to top management support and the adoption of CC. They reported that there would be a negative impact as there are no real and proven benefits for top management at the moment:

> "*I would say that top management support has a negative impact at the moment. Because there is no real and proven benefits show the effect of top management support on the adoption of CC*" (C7-RTS).

Another reason reported by participants was that there would be a negative impact if top management lacks real understanding for CC:

> "*Top management support, I think has a big negative impact; trouble is they do not really understand of the adoption of CC. They get told of all these benefits in cloud and they come up with utilise cloud and then we tell them how much it costs then they change their mind*" (C39-URM).

They reported that there would be a negative impact as top management is more concerned with the cost and budget of the adoption

> "*The impact's low, there. It depends to have vested the management and staffs are in the technology that runs. It sort of leads back to your earlier question there, if you achieve a transition where the end result for the users, especially comparable to the old system and I think as far as the impact of them, it should be low? Management side, it looks like budgets and stuff like that but the users' side, the impact should be low*" (C53-RTL).

Others were unsure of what the support of top management can do to the adoption of CC. The participants expressed that they were not sure of the impact as there is still a lack of understanding from top management with regard to CC adoption.

> "*We do not think the decision should be made at top management because we do not know if it is going to be a cost-saving, right? So unless there is a reasonable business reason to do it, it is not a top management decision. If the top management is making the decision, it is gambling with its business so you cannot say whether it is positive or negative because at this stage there is just not enough information around it*" (C40-UDV).

- **Organisation size**

The impact of the organisational size on CC adoption was to be positive. Three main reasons were provided:

1. Positive impact especially for the smaller organisations as they are more flexible in adopting new technology.

> "*I think that it is easier for smaller organisations. I think it is also easier for young organisations that have not yet sunk capital investment into a whole portfolio of technology and applications so smaller and younger organisations are more likely top mover to cloud*" (C68-URL).

2. Positive impact as the organisation can capitalise on CC.

> "*Organisation size, we would fall in within those sizes to be able to capitalize on a cloud service delivery providing it is cost effective. I will certainly not recommend something to go out to the cloud if it is not cost effective for the organisation*" (C11-RAV).

3. Positive impact especially for the bigger organisations as they have the resources for CC adoption.

> "*A larger organisations might experience being, they take longer to change put it that way. Typically changes are harder to achieve but once the ball starts moving, or the project starts rolling, they have more resources to throw at it*" (C39-URM).

Some participants had a negative view of how the organisation will influence the adoption of CC. They reported that there would be a negative impact as there are no real and proven benefits for the organisation size at the moment.

> "*There is no real benefit at this stage that has been identified and additional training would just be an expense. For that reason, I would say that organisation size has a negative impact at the moment*" (C7-RTS).

Others were unsure if the organisation size would positively or negatively influence the adoption of the cloud model. Participants reported that, they are unsure if the impact would depend on the organisation size or not.

> "*Related to the organisation size we can see those two sides (small and big) of the story. I think for us, I guess for the size of our council and the*

> *amount of employees we have; we do not know if that will affect our decision to move forward or not*" (C28-URS).

- **Employees' knowledge**

The impact of employees' knowledge on CC adoption was again found to be positive. Two main reasons were provided:

1. Positive impact if the level of employees' knowledge is such that they fully understand CC:

> "*Employees' knowledge I believe it will have a positive impact if the employees and the end users were familiar with using it, they would be a lot quicker to pick up on it and to use it*" (C19-RTL).

2. Positive impact as employees' knowledge and skills will be increased.

> "*Employees' knowledge I believe that would certainly be the case, the more informed the users are on what they expect to what their expectations are, how they are going to work. They are always easy to handle change if they know what that effect is going to be. So yes, certainly a move to the cloud if they understood what that is that going to be about and what their end-user experience would be, it would be a positive to have that. Whether, I suppose any no idea of cloud solution or ideal transition for cloud or probably would be fully transparent to the users I said it would not affect them at all*" (C45-RAV).

There was only one participant who believed that employees' knowledge would result in a negative impact on the adoption of CC. This participant reported that there would be a negative impact as there are no real or proven benefits for employees' knowledge at the moment:

> "*I would say that employees' knowledge has a negative impact at the moment. Because there is no real and proven benefits show the effect of employees' knowledge on the adoption of CC*" (C7-RTS).

One participant was uncertain of the impact of employees' knowledge on the adoption of CC. The participant was not sure how employees' knowledge would impact the adoption of CC.

> "*Employee's knowledge, I am not sure if there is a correlation there. There is a sense in which an organisation with low staff knowledge might in advisedly jump into cloud more regularly but that would not be a good thing so I am not exactly sure what the correlation there would be*" (C68-URL).

5.5.4 The Impact of the Environmental Factors on Cloud Adoption

This research suggests that the environmental factors of CC adoption such as; government regulation and information intensity have a positive impact, upon analysis of the responses of the participants interviewed. Government regulation had a positive impact with 67 percent of the sample population in support of it. Information intensity was believed to have a positive impact with 67 percent of the sample population in support of it. Table 5.12, illustrated the exploratory stage findings of the impact of the environmental factors.

Table 5.12: Impact of the environmental factors

Factors	Impact	Frequency	%	Reasons
Government Regulation	Positive	14	67%	• Positive impact if proper and effective regulations are implemented. • Positive Impact as regulations can provide better process and system for adoption.
	Negative	3	14%	• Negative impact as a lot of factors is needed to be considered for the regulations. • Negative impact if the government situates pressure on the adoption of CC.
	Not sure	4	19%	• Not sure as organisations have not reached the said stages of CC.
Information Intensity	Positive	14	67%	**3.** Positive impact if CC can maximize information intensity. **4.** Positive impact if CC can provide timely access to information.
	Negative	2	10%	• Negative impact as freedom of access to more information can create bigger and greater issues in the future.
	Not sure	5	23%	• Not sure as organisations have not reached the said stages of CC.

- **Government regulation**

The impact of government regulation on CC adoption was found to be positive. Two reasons were provided:

1. Positive impact if proper and effective regulations are implemented.

> "*Government regulation has the potential to drive the use of cloud services as regulations are refined to make it easier for councils/agencies to utilise. Government regulation could also force the use of cloud solutions in some circumstances*" (C61-URM).

2. Positive impact as regulations can provide better processes and systems for adoption.

> "*Government regulation, yes if the regulations change and they say we must utilise cloud services for any future software procurement or hardware procurement then we just have to do it*" (C39-URM).

Some participants suggested that the implementation of government regulations and policies may have a negative impact on the adoption of CC. Based on their responses, two reasons were provided:

1. Negative impact as a lot of factors are needed to be considered for the regulations.

> "*There are sensible things to consider similarly, with information privacy. There are some things to consider there but so long as the Australian legislation obligations can be met then there is no in policy impediment that I am aware of the adopting a cloud solution*" (C68-URL).

2. Negative impact if the government situates pressure on the adoption of CC.

> "*I think if the government regulated put pressure on it maybe a negative*" (C19-RTL).

Others were unsure of the impact of the implantation of government regulation with regard to CC. Participants mentioned that they were not sure as their organisations have not reached the said stages of CC.

> "*I would have differencing that because we are not particularly involved in this stage. We have not really gone into what the government regulations are. I have not really worried about at all*" (C7-RTS).

- **Information intensity**

The impact of the information intensity on CC adoption was found to be helpful and positive. Two reasons were provided:

1. Positive impact if CC can maximise information intensity.

> "*Information intensity, yes if cloud provides the councils with accurate information and with fast access to that information that will be positive*" (C45-RAV).

2. Positive impact if CC can provide timely access to information.

> "*Information intensity I think that would have a positive impact. Because CC will provide our system with quick and good access to the information*" (C19-RTL).

Some participants believed that there would be a negative impact as freedom of access to more information can create bigger and greater issues in the future:

> "*The issue there is about getting access to information. You probably do not have the same freedom that you do if you had the solution built in-house. So you cannot walk in to the... the data centre and you know, and get access to what you want but I think that is also changing*" (C34-UFV).

Others were unsure of what to answer as organisations have not reached the said stages of CC.

> "*I would have differencing that because we are not particularly involved in this stage. We have not really gone into what the government regulations are. I have not really worried about at all*" (C7-RTS).

5.5.5 Comparative Analysis of Proposed Research Modal Factors

In this analysis, Leximancer clustered the concepts into six themes (cloud, data, information, impact, things, systems), each theme aggregating two or more concepts and represented by labelled circles as they have been illustrated in Figure 5.9. Figure 5.9 illustrates the IT managers' views of the factors that have impact on the intention to adopt CC in ARMGs. This figure depicts the central theme within the map was 'cloud', and being strongly linked to the themes data, information, impact, and things. The dominate theme cloud has strong associations with most other concepts on the map. Cloud is multifaceted in its use: relating to government, security, infrastructure, use, moving, and stuff. The concepts in the map such as computing, security, infrastructure, service, government, data, and organisations are shown to be frequently occurring and strongly connected to the theme cloud. Another theme illustrated but not connected to the theme 'cloud' was 'systems'. The centrality of this theme provides a starting point for the research analysis.

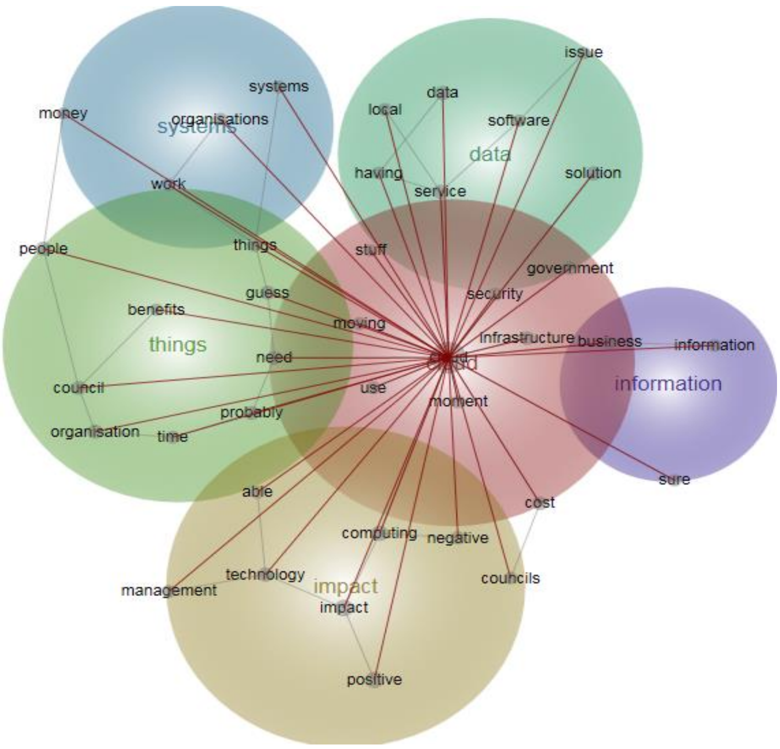


Figure 5.9: Cloud adoption factors key concepts map

The theme of 'impact' which contains the concept 'positive' links strongly to the findings within the MCA that suggested that IT managers saw CC as having a positive impact on their organisations. For more details see Figure 5.10.

The concept 'positive' and it's linkages on the concept map, through the analysis, have been illustrated through Figure 5.10. This concept is linked to all other concepts on the map. These linkages are to be expected with 'positive' being the top ranking concept. The strongest linkages shown in Figure 5.10 as following: (a) between positive and technology, (b) between positive and management, (c) between positive and cost, (d) between positive and information, (e) between positive and infrastructure. These strengths are expected due to the focus of the research and the qualitative questions asked, which were related to the factors that have an impact on the intention to adopt CC in ARMGs.

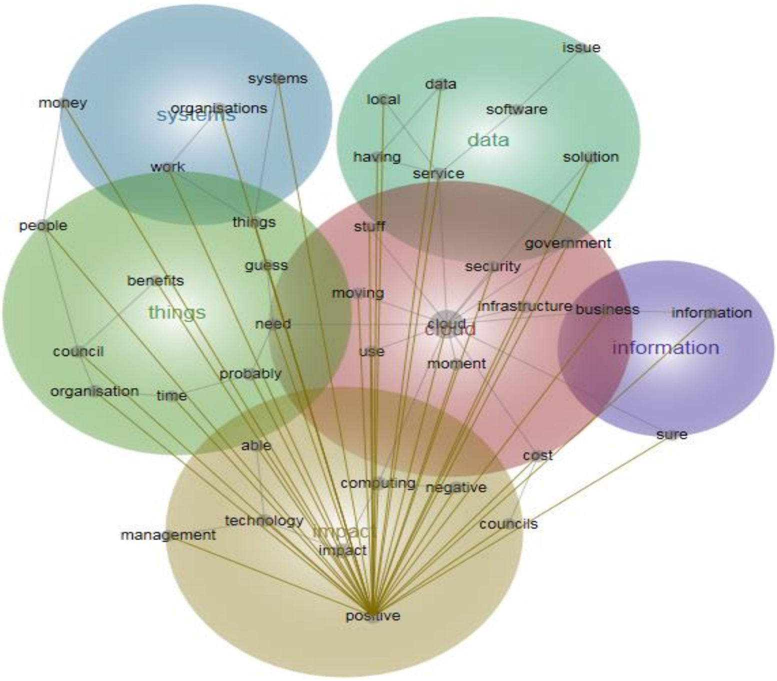


Figure 5.10: Positive impact factors and related linkages

When discussing the concept 'positive' the IT managers were referring to the positive impact of technology, management, cost, information, and infrastructure. In relation to the mentioned concepts Table 5.13 illustrates the representative quotes of each concept.

Table 5.13: Positive factors/concepts and themes

Leximancer-derived concepts	Representative quotes	Theme
Technology	"*About the technology readiness, in my opinion, our council system now ready to move to cloud. So, it is positive*"	Impact
Management	"*For the top management support, it is definitely has positive impact on the decision to adopt any new technology*"	Impact
Cost	"*Well I think it is, I mean, there definitely has positive. Yes, positive impact because the cost is going to be cheaper*"	Cloud

Infrastructure	"*I think., the relative advantages of CC like; reduce IT infrastructure, reduce the level of the risk away from the councils as I mentioned that make positive impact to adopt this type of technology*"	Cloud
Government	"*Government regulations have a positive impact as I said. We help to comply with the government and there is risk management with our IT and a witness continuity plan and we do comply with those regulations after going to the cloud base*"	Cloud
Organisation	"*Organisation size will be positive impact especially the smaller once; they are more flexible to move to adopt new technology*"	Systems
Benefits	"*It would have to be some benefit to the organisation to move down those technologies. If cost reduction is one of benefits, it is definitely a positive thing*"	Things
People	"*knowledge, if they know the products that they are be going to use in the cloud solution, then that could be a positive effect like one of the big things have people are offering is the Office 365 package as part of the cloud solution*"	Things
Security	"*If they got policy procedure and they tell you what they are using for their security platforms, then yeah, it is all cover under then will be positive - it all depends on the provider*"	Cloud
Information	"*I think that would have a positive impact. Because CC will provide our system with quick and good access to the information*"	Information
Solution	"*Compatibility I have to say, it will be a positive aspect because it can be a simple plight solution for a lot of businesses. Complexity, it should be simple as, if it is done competently and right by the provider of the cloud solution*"	Data

The analysis of the data found a number of aspects that were addressed by IT managers. These aspects included the impact of technology, management, cost, infrastructure, government, organisation, benefit, people, security, information and solution on the adoption of CC. After having a comparison between the results from Leximancer and the manual analysis, it was found that both the methods gave the same result in a relation to the factors that have an impact on the intention to adopt CC in ARMGs.

5.5.6 Discussion the Adoption Impact of the Proposed Model Factors

This section provides the discussion that related to innovation characteristics, technological, organizational, and environmental factors.

5.5.6.1 Innovation characteristics impacting cloud adoption

Certain innovation features of CC are inclusive of compatibility and complexity and influence the evaluation of participants' responses positively in accordance with the research. The compatibility influences positively with 76 percent of the sample population. The complexity influences positively with 57 percent of the sample population.

***Compatibility*.** According to studies conducted by Lee (2004) and Kamal (2006), the implementation of CC services are considered to show compatibility to the organisations. A number of authors have carried out research in order to clarify the compatibility in CC and they refer the compatibility as a significant determinant of IT innovation implementation (Ching & Ellis, 2004; Daylami et al., 2005; Premkumar & Roberts, 1999; Rogers, 2003).

On the basis of participants' responses the compatibility of CC has a positive impact over the adoption of CC which is due to the below reasons:

1. CC is easily compatible with the existing IT infrastructure.

2. The positive impacts balance the negative results attained in the compatibility.

As a result, these exploratory findings are consistent with previous literature that found compatibility to be a significant factor in cloud computing adoption decisions.

***Complexity*.** The organisations may face challenges and difficulties with transforming the processes due to the implementation of new technology in which they intermingle with their business systems. Some researchers have clarified this situation by stating that new technologies must be easy-to-use and accessible for amplifying the proportion of implementation (Sahin, 2006). Within the execution of CC, complexity seemed to be an essential element as demonstrated in a number of studies (Chaudhury & Bharati, 2008; Harindranath et al., 2008; Tiwana & Bush, 2007). In this research, complexity serves to have a positive effect concluded on the participants' responses and for this positivity; merely one reason was given:

1. Positive impact as complexity of CC is less than that of other technologies.

As a result, these exploratory findings are consistent with previous literature that found complexity to be a significant factor in cloud adoption decisions.

5.5.6.2 Technological factors impacting cloud adoption

As per the research outcomes and meticulous evaluation of the participants' responses, the technological factors of CC, comprising of cost and security concern, both have a positive influence. About 76 percent of the sample population showed positive effect of cost. Security concern demonstrated positive impact by 57 percent of the sample population.

Cost. As per the explanation of some researchers, cloud services are now utilised by organisations to achieve the benefits such as cost saving, which is the basic purpose of its exploitation (Miller, 2008; Zhu et al., 2006a). The usage-based pricing model happens to be the cause of the enhanced financial gain. The cloud services, if utilised by newly established organisations, can assist to diminish their capital expenditures and obstacles (Grossman & Gu, 2009). The cost plays a pivotal role in CC in this research as originated from the participants' responses and for this, they granted merely two explanations:

1. It tends to be cost effective and facilitates organisations in decreasing their expenditure.

2. Positive impact if the cost reductions are verified and reasonable.

As a result of that, these exploratory findings are consistent with previous literature that found cost to be a significant factor in cloud adoption decision.

Security concern. As described by Kaufman (2009) Paquette et al. (2010); Subashini and Kavitha (2011), security is one of the major concerns prominently seen in computer applications, compared to other fields. The authors further commented that CC provides both computing in a joint multi-user atmosphere and storage (Kaufman, 2009; Paquette et al., 2010; Subashini & Kavitha, 2011). In this research stage, most participants' responded by agreeing that CC tends to have a positive effect in regards to security and for this; two consequences were provided which are listed below:

1. CC endows a more defensive atmosphere for data sharing.

2. In CC, due to their regulations, security is not a concern.

Based on the findings of the exploratory stage, it confirmed that security concern is a significant factor and has positive impact on cloud adoption decision.

5.5.6.3 Organisational factors impacting cloud adoption

As per a meticulous evaluation of participants' responses and the research, the organisational factors of CC like top management support, organisation size, and employees' knowledge have a positive effect. About 67 percent of the sample population showed positive effect of top management support, while organisation size had a positive effect as per 71 percent of the sample population. Employees' knowledge as another organisational factor of implementation demonstrated positive impact by 90 percent of the sample population.

Top management support. According to the studies conducted by Daylami et al. (2005); and Eder and Igbaria (2001), top management's attitude and support has great power to cause a positive effect over the implementation of technology innovation. Top management's support seems to play a very significant role in sustaining the essence of probable change by means of an eloquent vision and role model for the organisation and through transmitting signals to employees of the organisation in regard with the adoption of new technological innovation for the attainment of goals (Low et al., 2011). In this research, based on participants' responses, top management support influences CC implementation positively on the basis of the reason that:

1. Positive impact if CC is supported by the top management as it will provide better services.

As a result of that, these exploratory findings are consistent with previous literature that found top management support to be a significant factor and has a positive impact on cloud computing adoption decisions.

Organisation size. There is evidence that the size of an organisation is one of the major factors associated with IT innovation (Dholakia & Kshetri, 2004; Hong & Zhu, 2006; Pan & Jang, 2008). It is usually suggested that smaller sized firms are more flexible in terms of changing direction (Grover & Teng, 1992; Jambekar & Pelc, 2002). Some empirical studies have indicated that there is a positive relationship between the size of an organisation and adoption of new technology (Zhu et al., 2004). It is often reported that large firms tend to adopt more innovations, largely due to their greater flexibility and ability to take risk (Zhu et al., 2004). As per this research and participants' responses, organisation size influences CC implementation positively on the basis of three consequences:

1. The bigger organisations influence positively due to the fact they comprise resources which help in the implementation of CC.

2. The small-scale organisations have positive effect as they will attain flexibility in the implementation of a new technology.

3. The organisations have the capability to capitalise CC showing positive effect.

As a result of that, these exploratory findings are consistent with previous literature that found organisation size to be a positive impact factor on cloud adoption decision.

Employee's knowledge. Roger (1995) stated that with the implementation of new innovation, the employees' adoption attitude can have an impact through the gathered experience. If we consider CC in the form of new innovation then it actually depicts familiarity with technologies like utility computing; cluster computing and virtualisation will directly impact the discernments of employee in regard to CC. A number of theorists and researchers have stated that certain studies have shown that previous experience plays a significant role in the implementation of new technology (Igbaria et al., 1995; Kuan & Chau, 2001; Lippert & Forman, 2005). Employee's knowledge influences CC positively as illustrated through this research and participants' responses, due to two primary reasons:

1. Knowledge of employees will be highly influenced with the implementation of CC.
2. If employees have entire knowledge and apprehension of CC then it can influence positively.

As a result of that, these exploratory findings are consistent with previous literature that found employees' knowledge to be a significant factor and has positive impact on CC adoption decision.

5.5.6.4 Environmental factors impacting cloud adoption

Certain environmental factors of CC, inclusive of government regulation and information intensity, influence the evaluation of participants' responses positively in accordance with the research. Government regulation influences positively with 67 percent of the sample population, even the information intensity has the same effects as government regulation.

Government regulation. This term implies the support attained from the authorities for the purpose of convincing an increase in the implementation of IS innovations (Kuan & Chau, 2001). Even the governments have the power to promote CC implementation through formulating regulations in order to shield businesses by utilising this system (Kuan & Chau, 2001; Oliveira & Martins, 2010; Zhu & Kraemer, 2005). In this research, government regulation serves to have a positive effect concluded on the participants' responses and for this positivity; two important consequences were listed:

1. Regulations are formulated to ensure better systems and processes for the implementation demonstrating positive effect.

2. Effective and appropriate regulations' implementation depicts positive effects.

As a result, these exploratory findings are consistent with previous literature that found government regulation to be a significant factor and has positive impact on the cloud adoption decision.

***Information intensity*.** Organisations in different sectors experience different information intensities, for example financial organisations need to have access to the most current information. For this research, information intensity is the organisation's reliance on accessing up to date, reliable, relevant and accurate information whenever they need it. As a result, previous studies have reported that firms that use more advanced ICT technologies have more ability to access internal, external and previously encountered information (Chau & Tam, 1997; Chong et al., 2009; Thong, 1999). It allows the quick retrieval of information and facilitates information accessibility (Huber, 1990). Information intensity, in accordance with the opinions of participants and research evaluation, positively influences the implementation of CC due to two consequences:

1. CC has the capability to grant up-to-date and appropriate information influencing information intensity positively.

2. CC has the ability to make best use of information intensity and influencing positively.

As a result, these exploratory findings are consistent with previous literature that found information intensity to be a significant factor and has a positive impact on cloud computing adoption decisions.

5.5.7 Conclusion of Proposed Research Model Factors

The exploratory stage findings that demonstrate which factors influenced the adoption of CC in ARMGs are restated in Table 5.14, and in those findings, there are linkages made for each local council with the factors that they identified as being considerations for the adoption of CC.

Table 5.14: Summary of exploratory stage findings

Constructs	Evident in Councils	Frequency	%
Innovation Characteristics			
Compatibility	C11, C15, C16, C18, C19, C21, C34, C39, C40, C42, C45, C52, C53, C55, C61, C72.	16	76%
Complexity	C11, C18, C34, C40, C42, C45, C52, C53, C55, C61, C72, C74.	12	57%

Technological Factors			
Cost	C7, C11, C15, C18, C19, C21, C25, C28, C34, C40, C45, C52, C53, C55, C61, C68.	16	76%
Security Concern	C11, C15, C18, C21, C25, C39, C40, C42, C52, C55, C68, C74.	12	57%
Organisational Factors			
Top Management Support	C11, C16, C18, C19, C21, C25, C28, C42, C45, C52, C55, C61, C68, C72.	14	67%
Organisation Size	C11, C15, C16, C18, C19, C21, C25, C34, C39, C42, C45, C55, C68, C72, C74.	15	71%
Employee's Knowledge	C11, C15, C16, C18, C19, C21, C25, C28, C34, C39, C40, C42, C45, C52, C53, C55, C61, C72, C74.	19	90%
Environmental Factors			
Government Regulation	C11, C16, C18, C25, C34, C39, C40, C42, C45, C52, C53, C55, C61, C72.	14	67%
Information Intensity	C11, C16, C18, C19, C21, C25, C28, C39, C40, C45, C55, C61, C68, C72.	14	67%
Benefit Characteristics			
Anticipated Benefit	C11, C15, C16, C18, C19, C21, C25, C28, C34, C39, C40, C42, C45, C52, C53, C55, C61, C68, C72, C74.	20	95%

With the increasing trend of technology, computing services and the need for new innovations, along with its implementation, are changing the way IS services are widened, sustained, levelled and reimbursed. CC was actually founded with the prior developments like outsourcing and virtualisation, but its originality tends to be the widespread process of granting computing services while utilising efficient Internet connections as elaborated by (Leimeister et al., 2010; Yadav & Zeng, 2010). In the field of discovering and promoting the ARMGs cloud implementation model, this qualitative research work is done for the first time, which was notionally based in the TOE framework assimilated with DOI theory and its first stage of execution demonstrates five intermingled contexts of this framework inclusive of innovation characteristics; technological context; organisational context; environmental context; benefit characteristics. The main factors which are responsible for their significant presence in the ARMG's implementation of cloud services include: compatibility, complexity, cost, security concern, top management support, organisation size, employees' knowledge, government regulation, information intensity and anticipated benefit.

The research community and the IT managers will be greatly benefitted by these initial findings in the areas of creating better strategies for the implementation of CC. This research has a proposed model which can help in amplifying the apprehension of reasons for some local council's decision to implement CC services. Furthermore, there is a limitation to CC that it is required to be further developed in regards to their interface with local government councils engrossed in the experience of CC making an effort to formulate a fruitful environment for the implementation of CC, while eradicating imprecision in this type of technological innovation.

5.6 Summary

This chapter has provided an analysis and discussion related to the critical drivers of CC adoption. Furthermore, it has provided analysis and discussion about the research proposed model factors. The following chapter will report on the results of the research structural model with path coefficient relationships and the test of all hypotheses.

6 CHAPTER SIX:-

QUANTITATIVE DATA ANALYSIS

6.1 Overview

The previous chapter provided analysis and discussion related to the critical drivers of CC adoption. Also, provided analysis and discussion about the research proposed model factors. This chapter outlines the results of quantitative data analysis. It starts with the results of descriptive analysis on the survey respondents' and firms' demographics, followed by the validation of the research instrument which includes FA for the data that collected related to the research proposed model and a validity and reliability tests. Next follows a structure model test; then an examination of the hypotheses results; and finally, a discussion of the overall findings.

6.2 Respondents' and Firms' Demographics

The survey was distributed online to Queensland's 77 councils through USQ's Custom Survey System. IT Managers from 47 councils responded to the survey which represented a response rate of 61 percent. The participating 47 councils had around 786 IT staff who were invited to participate and 480 responded.

6.2.1 Respondents' Demographics

The respondent's demographics data in this research including: roles in the field of IT, knowledge related to CC, and total years' experience with CC. Each of these respondent's demographics data will addressed next.

- **Role in the field of IT**

Table 6.1 represents the participant's roles in the field of IT in the study. The table shows that 238 of the respondents with 49.6 percent reported they were in an IT management role, 138 of the respondents with 28.8 percent were in systems development/analyst/programmer roles, 101 of the respondents with 21 percent were in IT as operations/systems administrator/user support roles, and only 3 of the respondents with 0.6 percent indicated other roles including ICT management strategy, project management asset, and IT support.

Table 6.1: Roles in the field of IT

Roles in IT	Frequency	Percent	Cumulative %
Management	238	50 %	49.6%
Systems development/ Analyst/ Programmer	138	28.8 %	78.3%
Operations/ Systems administrator/ User support	101	21 %	99.4%
Other	3	0.6 %	100%
Total	**480**	**100 %**	

Figure 6.1 illustrates the frequency of roles in the field of IT. This range that shown in the figure indicates that most roles of the participants in the field of IT are in the area of management.

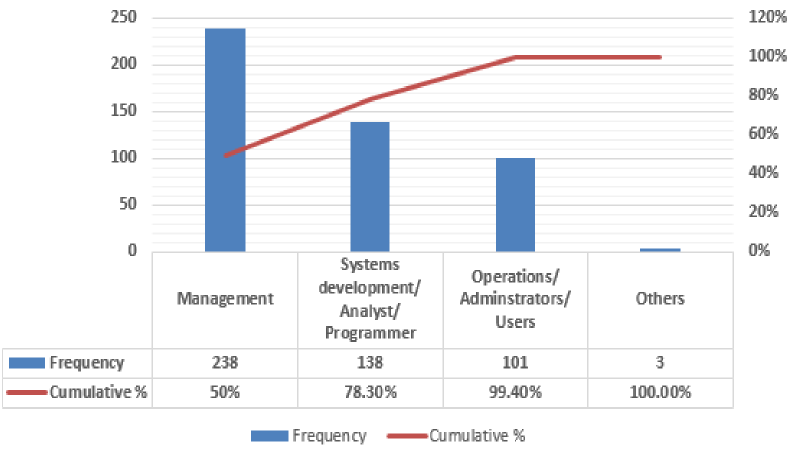


Figure 6.1: Chart of roles in IT frequency

- **Knowledge related to cloud computing**

Table 6.2 represents the participant's knowledge related to CC in the study. The table indicates that nearly half of the respondents 238 with 49.6 percent reported had good knowledge related to CC, 111 of the respondents with 23.1 percent reported had some knowledge about cloud. One hundred and six of the respondents with 22.1 percent reported had a little knowledge about the cloud. Just 20 of the respondents with 4.2 percent reported had an excellent knowledge. There were only 5 respondents with 1 percent reporting no knowledge about CC. These results indicate that most of the respondents have considerable knowledge related to CC.

Table 6.2: Knowledge related to cloud computing

Knowledge related to cloud	Frequency	Percent	Cumulative %
No knowledge	5	1 %	1.0%
Little knowledge	106	22.1 %	24.2%
Some knowledge	111	23.1 %	73.8%
Good knowledge	238	49.6 %	95.8%
Excellent knowledge	20	4.2 %	100%
Total	**480**	**100 %**	

Figure 6.2 illustrates the frequency of the participants' knowledge in relation to CC. The mean of the participants' knowledge in CC is 4.05. This range indicates that most of the participants have good knowledge in relation to CC.

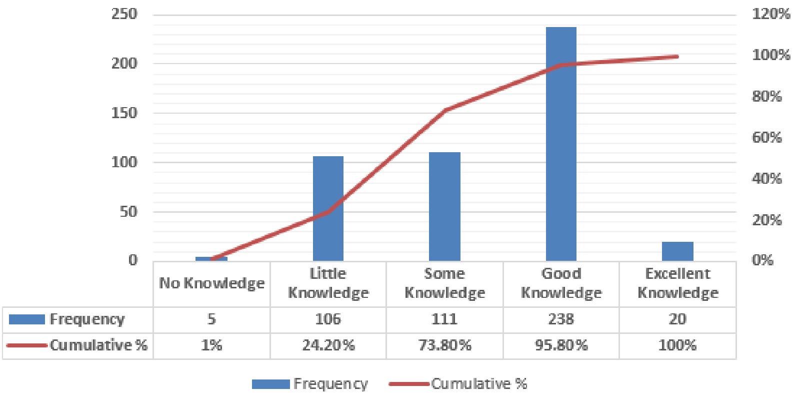


Figure 6.2: Chart of knowledge related to cloud frequency

- **Total years' experience with cloud computing**

Table 6.3 represents the participant's years of experience with IT in the study. The table indicates that more than half of the respondents 250 with 52.1 percent reported an experience with IT between 2-5 years, followed by 111 of the respondents with 23.1 percent reported an experience with IT between 6-10 years. About 95 of the respondents with 19.8 percent reported an experience with IT less than 1 year. 12 of the respondents with 2.5 percent were never have an experience with IT, followed by 8 of the respondents with 1.7 percent reported an experience with IT between 11-14 years. The lowest rate was the respondents who reported an experience more than 14 years, with only 0.8 percent. These results indicate that most of the respondents have considerable experience related to IT.

Table 6.3: Years' of experience with IT

Years' of experience	Frequency	Percent	Cumulative %
Never	12	2.5 %	2.5%
Less than 1 year	95	19.8 %	22.3%
2-5 years	250	52.1 %	74.4%
6-10 years	111	23.1 %	97.5%
11-14 years	8	1.7 %	99.0%
More than 14 years	4	0.8 %	100%
Total	**480**	**100 %**	

Figure 6.3 illustrates the frequency of the participants' years of experience with IT. The mean of the participants' years of experience with IT is 3.04. This range indicates that most of the participants' years of experience with IT were between 2 and 5 years.

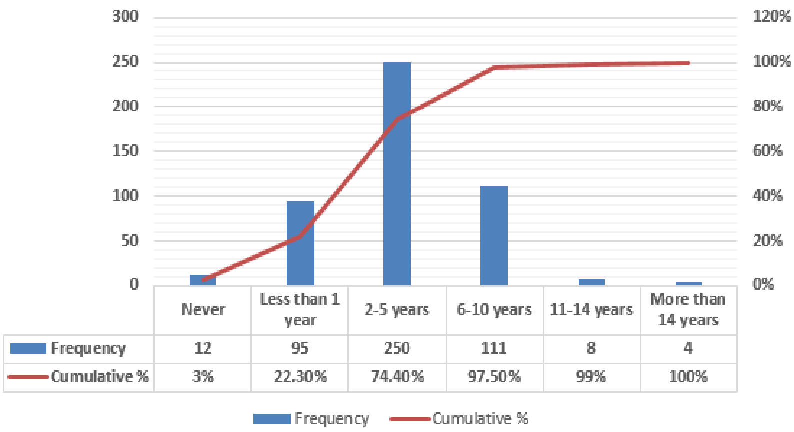


Figure 6.3: Chart of years' of experience with IT frequency

6.2.2 Firms' Demographics

The firm's demographics data in this research including: size of organisation, organisation adopted CC, the current level of cloud adoption, type of cloud service/delivery model, type of cloud deployment model, cloud based applications that used by organisation, and organisation planning to adopt a cloud based services solution. Each of these firm's demographics data will addressed next.

- **Size of organisation in terms of number of employees**

Table 6.4 represents the size of organisations in the study. The table indicates that 214 of the respondents with 44.6 percent who were from very large local councils (751-1500), and 150 of the respondents with 31.3 percent who were from large local councils (251-750). 90 of the respondents with 18.8 percent were from medium local councils (101-250), followed by 19 of the respondents with 4 percent who were from small local councils (51-100). There were only 7 respondents with 1.5 percent who were from very small local councils (less than 50). These results indicate that more than 75 percent of the respondents from large and very large councils.

Table 6.4: Size of organisation

Size of organisation in terms of number of employees	Frequency	Percent
Extra small (Less than 50)	7	1.5 %
Small (51-100)	19	4 %
Medium (101-250)	90	18.8 %
Large (251-750)	150	31.3 %
Very large (751-1500)	214	44.6 %
Total	**480**	**100 %**

- **Organisation adopted cloud computing technology**

Table 6.5 shows councils that have adopted CC, almost 389 of the respondents with 81 percent had adopted CC technology in their councils. Just 44 of the respondents with 9.2 percent had not adopted CC technology in their councils and the other 47 of the respondents with 9.8 percent were not sure if their councils had adopted CC technology or not.

Table 6.5: Organisation adopted cloud computing

Organisation adopted CC	Frequency	Percent
Yes	389	81 %
No	44	9.2 %
Not sure	47	9.8 %
Total	**480**	**100 %**

- **The current level of cloud computing deployment within the organisation**

Table 6.6 represents the current level of CC deployment within the organisation in the study. The table indicates that 206 of the respondents with 42.9 percent reported some adoption of cloud services within their councils, followed by 178 of the respondents with 37.1 percent who reported full adoption for some services in their councils. About 91 of the respondents with 19 percent reported no adoption of cloud services in their councils. The lowest level of cloud adoption was the respondents who were still in pilot test stage with only 1 percent.

Table 6.6: Organisation adopted cloud computing

Level of CC deployment	Frequency	Percent
Full adoption for some services	178	37.1 %
Some adoption	206	42.9 %
Still in pilot test stage	5	1 %
Not adopted	91	19 %
Not sure	0	0.0 %
Total	**480**	**100 %**

- **Type of cloud service/delivery model does the organisation use**

Table 6.7 represents the types of cloud service/delivery model does the organisation use in the study. The table indicates that of the approximately 389 respondents, 81 percent were using SaaS as their preferred service model within their councils, with the second largest group comprising 128 of the respondents who represented 26.7 percent of the sample, who stated that they were using PaaS as the preferred service model within their councils. Only 19 of the respondents with 4 percent were used IaaS as service model within their councils. These results indicate that local councils are more likely to use cloud application and software.

Table 6.7: Type of cloud service model organisation use

Type of cloud service model organisation use	Frequency	Percent
Software-as-a-Service (SaaS)	389	81 %
Platform-as-a-Service (PaaS)	128	26.7 %
Infrastructure-as-a-Service (IaaS)	19	4 %
Other	0	0.0 %

- **Type of cloud deployment model does your organisation use**

Table 6.8 represents the types of cloud deployment model does the organisation use in the study. The table indicates that 352 of the respondents with 73.3 percent who were used public cloud within their councils, followed by 337 of the respondents with 70.2 percent who were used private cloud within their councils. None of the respondents used hybrid and community cloud computing within their councils.

Table 6.8: Type of cloud deployment model organisation use

Type of cloud deployment model organisation use	Frequency	Percent
Private cloud	337	70 %
Public cloud	352	73.3 %
Hybrid cloud	0	0.0 %
Community cloud	0	0.0 %
Not sure	0	0.0 %

- **Cloud based applications that used by organisation**

Table 6.9 represents the cloud based applications that used by organisation in the study. The table indicates that the most common applications for cloud were: email with 75.8 percent, office productivity with 68.8 percent, data backup/storage/sync with 66.9 percent, telephone service/VoIP with 61.5 percent, disaster recovery with 56.7 percent, security with 50 percent, compliance with 37.1 percent, remote access/VPN with 32.9 percent, project management with 27.5 percent, and human resources with 25.6 percent. The other cloud based applications that have response rate about 10 percent and more, were: collaboration software with 18.3 percent, web conferencing with 13.5 percent, file storage/sharing with 11 percent, social networking and web hosting with 10 percent. The rest of the cloud based applications mentioned in Table 6.2 have a response rate lower than 10 percent.

Table 6.9: Cloud based applications that used by organisation

Cloud based applications that used by organisation	Frequency	Percent
Email	364	75.8 %

Email marketing	14	2.9 %
SMS/text messaging	25	5.2 %
Telephone service/VoIP	295	61.5 %
Web conferencing	65	13.5 %
Social networking/Web 2.0	48	10 %
Media monitoring	25	5.2 %
Office productivity	330	68.8 %
Project management	132	27.5 %
Accounting management	13	2.7 %
Grant management	8	1.7 %
Donor management	4	0.8 %
Volunteer management	10	2.1 %
Human resources	123	25.6 %
Client/member database/CRM	12	2.5 %
Payroll	12	2.5 %
Billing and invoicing	13	2.7 %
Data analytics	12	2.5 %
Training	28	5.8 %
Security	240	50 %
Data backup/storage/sync	321	66.9 %
Disaster recovery	272	56.7 %
File storage/sharing	53	11 %
Website hosting	48	10 %
Collaboration software	88	18.3 %
E-commerce processing	11	2.3 %
Remote access/VPN	158	32.9 %
Compliance	178	37.1 %
Other	0	0.0 %

- **Organisation planning to adopt a cloud based services solution**

Table 6.10 represents the organisation planning to adopt a cloud based services solution in the research. The table indicates that 376 of the respondents with 78.3 percent reported future planning to adopt cloud solution within their councils. Ninety five of the respondents with 19.8 percent were not sure for future planning to adopt cloud solution within their councils. Only 9 of the respondents with 1.9 percent reported not any future planning to adopt cloud solution within their councils.

Table 6.10: Organisation planning to adopt cloud computing

Organisation planning to adopt a cloud	Frequency	Percent
Yes	376	78.3 %
No	9	1.9 %
Not sure	95	19.8 %
Total	**480**	**100 %**

6.3 Factors Considered for Cloud Computing Adoption

Figure 6.4 demonstrates the research findings related to the factors that need to be considered for the adoption of CC in ARMGs. This suggests that Internet connectivity seen as strongly important with nearly 85 percent, followed by Internet speed with 70 percent. Then, data backup with nearly 65 percent, security with 53 percent, and cost with 50 percent. In other opinion, participants seen integration as just important with nearly 58 percent, followed by reliability, cost, and security with over 40 percent. Next, employees' knowledge with 38 percent, availability with 35 percent; and data backup with 28 percent.

Other participants seen data storage location as slightly important with nearly 50 percent, followed by provider dependability with 43 percent. Then, availability and reliability were closely to 40 percent, followed by employees' knowledge with 37 percent. Where, data sovereignty seen as neutral with nearly 32 percent, followed by transportability with 30 percent. For more details see Figure 6.4.

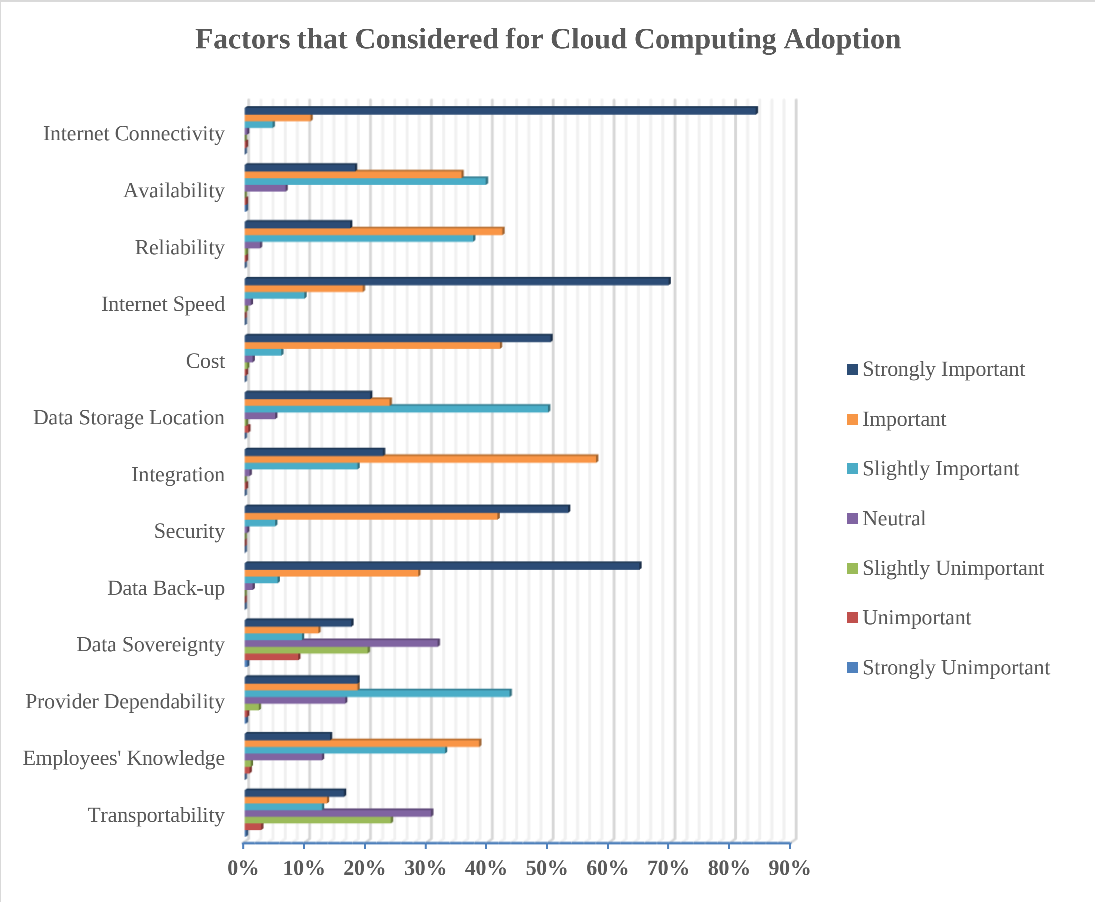


Figure 6.4: Factors considered for cloud adoption

6.4 Anticipated Benefit for Cloud Computing Adoption

Figure 6.5 demonstrates the research findings related to the anticipated benefits for the adoption of CC in ARMGs. This suggests that reduce IT infrastructure seen as most important as strongly agree with nearly 75 percent, followed by reduced level of risk with 70 percent, provide better services, storage capacity, disaster recovery and backup all of these benefits indicated by the participants as strongly agree with 65 percent, and remote access seen as most important as strongly agree with nearly 53 percent. Also, time efficiencies confirmed by the participants as strongly agree with 40 percent, followed by reduce staff with 38 percent, availability of the services with 33 percent, and flexibility with 25 percent.

Other participants seen cost reduction as important as agree with nearly 58 percent, followed by flexibility with 57 percent. Next, availability of services with 54 percent, and time efficiencies seen as important as agree with nearly 41 percent. Remote access with 34 percent, and reduce staff with 28 percent. For more details see Figure 6.5.

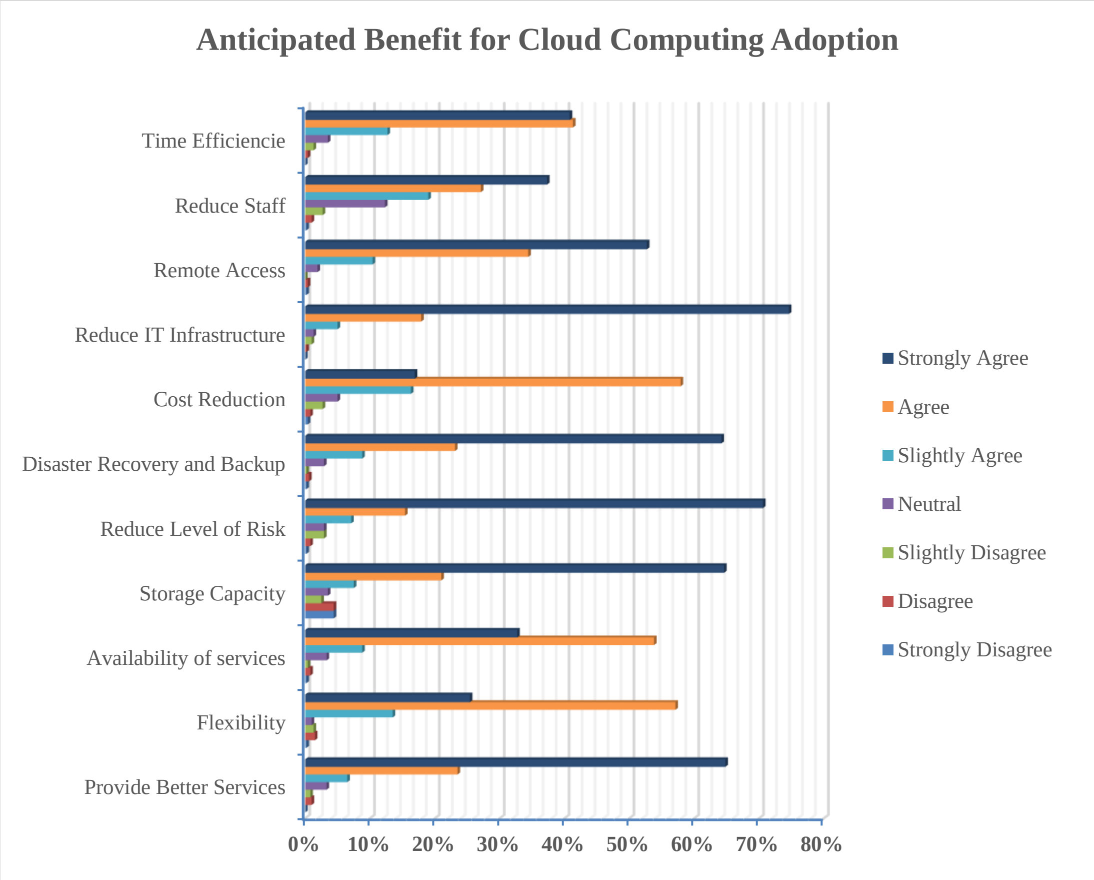


Figure 6.5: Anticipated benefit for cloud adoption

6.5 Challenges and Issues Influence Cloud Computing Adoption

Figure 6.6 illustrates the research findings related to the challenges and issues that influence the adoption of CC in ARMGs. This figure indicates that the need of an effective network seen as strongly important with nearly 80 percent, followed by loss of control over data with 70 percent, cost with 62 percent, security with 58 percent, backup with 57 percent, and availability of different providers with 55 percent, and data storage location with 32 percent.

Other participants saw integration as being just as important with 62 percent, followed by privacy with 49 percent. These were followed by security, backup, and availability of different providers with 33 percent. Also, they saw 'cost' and 'policy maker' as important with 28 percent. But, others seen trust as slightly important with 50 percent, followed by policy maker with 47 percent, data storage location with nearly 39 percent, and privacy with 30 percent. Data that presented in Figure 6.6, indicated that participants seen lack of real understanding of CC as neutral with nearly 39 percent, followed by business transformation with 26 percent. For more details see Figure 6.6.

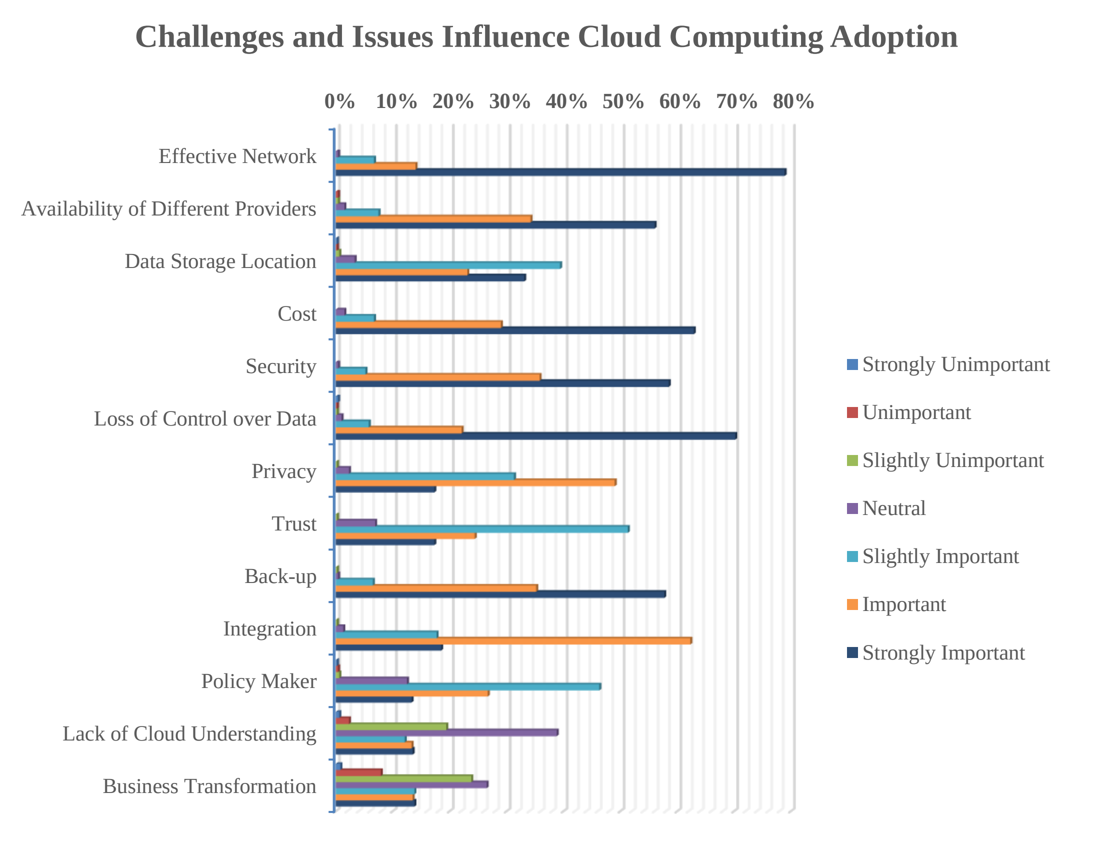


Figure 6.6: Challenges and issues influence cloud adoption

6.6 Descriptive Statistics

Descriptive statistics are an essential part of data analysis (Zikmund et al., 2009). It can be used to describe respondents' and firms' demographics. In this section SPSS Statistics 22 used to calculate the means and standard deviation on the research model variables that represented in the research survey. A 7 point Likert scale was used to measure the variables in the research proposed model.

Table 6.11 shows the level of the mean and the range of standard deviation of the items that used to measure the factors in the research model. Statisticians have determined that values no greater than 2 standard deviation represent measurements that are more closely near the true value than those that fall in the area greater than 2 standard deviations.

Table 6.11: Descriptive statistics

Code	Scale Items	Mean	Std. Deviation
Compatibility			
Compat1	CC is easily connected with the existing IT infrastructure of my organisation	5.92	0.95
Compat2	Using CC system is compatible with all aspects of my organisation	5.86	1.17
Compat3	CC is compatible with my organisation’s values and beliefs	6.10	0.92
Compat4	CC compatibility is not an issue for my organisation	6.21	1.27
Complexity			
Complex1	Using CC system is not seen as complex for business operations in my organisation	5.48	1.02
Complex2	The skills needed to adopt CC are not seen as complex for employees in my organisation	5.48	1.03
Complex3	Compared to other types of technologies CC is less complex	5.77	1.01
Complex4	Integration of CC with the existing IT system presents no problems for my organisation	5.69	1.29
Complex5	CC complexity is not an issue for my organisation	4.71	1.49
Cost			
Cost1	Maintenance costs of CC system are very low	6.29	1.16
Cost2	Energy and environmental costs of CC system are very low	5.86	0.79
Cost3	CC has low training costs	5.50	0.94
Cost4	CC decreases the investment cost in new IT infrastructure	6.58	0.80
Cost5	CC reduces the costs of systems upgrades	6.00	0.90
Cost6	CC is cost effective compared with the other IS technologies	6.15	1.06
Security Concern			
SecC1	CC provides a sufficient security transfer channel during the process of mass data interchange	5.44	1.28
SecC2	Using CC system solutions is trustworthy	5.80	0.75
SecC3	CC provides a secure service	5.34	0.93
SecC4	Cloud provider data centres provide greater security of data	5.12	1.03
SecC5	Cloud provider data centres have effective redundancy	4.70	1.27
SecC6	Cloud provider data centres have effective backup systems	5.83	0.79
SecC7	Cloud providers maintain the privacy of an organisation’s data	5.17	1.02
SecC8	Cloud providers maintain effective data confidentiality	4.65	1.35
SecC9	Security concerns are not an issue with CC	4.78	1.37
Top Management Support			
TMS1	Top management is willing to take the risks (financial and organisational) involved in adopting CC	5.92	0.81
TMS2	Top management is seriously considering the adoption of an appropriate CC system in my organisation	5.99	0.84
TMS3	Top management understands the benefits of CC systems	6.13	0.98

TMS4	Top management provides resources to support the adoption of CC	6.06	1.11
Organisation Size			
OZ1	The number of employees in my organisation is high compared to others in the industry	4.99	1.15
OZ2	The revenue of my organisation is high compared to others in the industry	4.98	1.11
OZ3	Small organisations are more flexible in adopting CC	5.93	0.95
OZ4	Bigger organisations with larger resources can easily move to adopt CC	5.99	1.16
OZ5	The size of an organisation impacts its adoption of CC	4.57	1.67
Employees' Knowledge			
EK1	IS staff in my organisation have the ability to support CC system development	6.00	0.89
EK2	IS staff in my organisation have previous IT development experience	5.99	0.91
EK3	Employee knowledge in my organisation plays a massive role in the adoption of CC	6.22	1.12
EK4	Organisations with employees who have more knowledge about CC are likely to more adoption	5.48	0.99
Government Regulation			
GR1	Government effectively promotes CC adoption	6.41	1.03
GR2	The data protection policies are regulated by government	6.40	0.95
GR3	Government regulations can provide a better process for adopting CC	6.29	1.03
GR4	Current government policy is focused on privacy	6.37	0.95
GR5	Current government policy is focused on security	5.99	0.91
GR6	Current government policy is focused on all of the risk factors	5.78	0.88
GR7	There is no specific government policy on adoption of CC	5.91	1.19
Information Intensity			
II1	The users and organisations in the same industries as my organisation rely on each other for information regarding services	5.89	0.75
II2	Users have access to sufficient information on how to use services	5.89	0.81
II3	Organisations in the same sector as my organisation can access sufficient information to support a change in services provided	5.99	0.88
II4	My organisation is dependent on up-to-date information	6.46	0.74
Anticipated Benefits			
AB1	Using CC system provides better services	6.45	0.94
AB2	Using CC system speeds up application processes	5.12	1.04
AB3	Using CC system improves data accuracy	4.96	1.11
AB4	Using CC system improves flexibility	5.99	0.91
AB5	Using CC system improves availability of services	6.12	0.87
AB6	Using CC system improves storage capacity	6.39	1.05
AB7	Using CC system improves security of data	5.83	0.98
AB8	Using CC system reduces the level of risk	6.45	1.07
AB9	Using CC system improves disaster recovery and backup	6.45	0.90
AB10	Using CC system provides cost reductions	5.77	0.98
AB11	Using CC system reduces IT infrastructure	6.63	0.75
AB12	Using CC system provides remote access	6.36	0.83
AB13	Using CC system reduces staff	5.81	1.22
AB14	Using CC system provides time efficiencies	6.16	0.91
Cloud Adoption			
Adopt1	Communications (email, telephone services, web conferencing, social networking, media monitoring)	6.09	.857
Adopt2	Data storage (security, data backup, disaster recovery)	6.13	.779

Adopt3	Office productivity (file sharing, collaboration software, management, human resources)	6.30	1.031

6.7 Measurement Development of the Research Proposed Model

To continue with measuring the fit of the proposed research model, there are some different statistical techniques that used to analyse the data. The first statistical technique is to ensure the scales' validity through FA test. This technique includes exploratory factor analysis (EFA), followed by confirmatory factor analysis (CFA). The second statistical technique is to test the reliability and validity of the scales to ensure about the internal consistency.

6.7.1 The First Statistical Technique

This technique is used to ensure the scales' validity through FA test. According to William et al. (2010), FA is an important tool which is employed in improvement, assessment of tests, and scales. This technique include exploratory factor analysis (EFA), followed by CFA. Each of these FA statistical techniques will be explored next.

6.7.1.1 Exploratory factor analysis (EFA)

EFA is an extensively utilised statistical methodology used in the fields of IS, education, and social science (Williams et al., 2010). In this research, the survey items are employed to determine the major constructs of the proposed research model. Some of these items were adopted from previous studies, and others were taken from IT managers who were in qualitative phase of the research as illustrated in Section (4.6.3.6) of methodology chapter. Hence, according to Chong et al. (2009), EFA was used in this research.

It is important to note that in EFA, sample size is very significant (Williams et al., 2010). A number of perspectives and regulations regarding the sample size in EFA are mentioned in the literature review (Hogarty et al., 2005; Tabachnick & Fidell, 2007). Hair (1995), recommended that the sample size of the EFA should be greater than 100 cases. It was recommended by some other analysts that sample size should be at minimum 300 cases for EFA (Tabachnick & Fidell, 2007). A research conducted by Comrey (1973) classified sample size of the EFA as: 100 is poor sample size; 200 is fair sample size; 300 is good sample size; 500 is very good sample size; and 1000 or more is excellent sample size. The sample size used in this research is approximately

480 cases and if it is compared with the categories put forward by Comrey (1973); this sample is considered to be a very good sample and suitable for EFA.

- ***Compatibility***

There were four items used to measure compatibility. Details presented in Table 6.12 illustrate the correlation matrix for these items. Table 6.12 shows the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.12 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.12: Correlation and loading matrix for compatibility

Correlation and Loading Matrix					
		Compat1	Compat2	Compat3	Compat4
Correlation	Compat1	1.000	.708	.480	.554
	Compat2	.708	1.000	.541	.589
	Compat3	.480	.541	1.000	.526
	Compat4	.554	.589	.526	1.000
Loading		.840	.872	.763	.810

It can be seen from Table 6.13 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.790, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidel,l 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.13: KMO and Bartlett's Test for compatibility

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.790
Bartlett's Test of Sphericity	Approx. Chi-Square	780.253
	df	6
	Sig.	.000

Table 6.14 indicates that there was only one component with an eigenvalue of 2.705. As demonstrated in Figure 6.7, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.14: Eigenvalue for compatibility

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	2.705	67.622	67.622	2.705	67.622	67.622
2	.558	13.946	81.567			
3	.452	11.288	92.856			
4	.286	7.144	100.00			
Extraction Method: Principal Component Analysis						

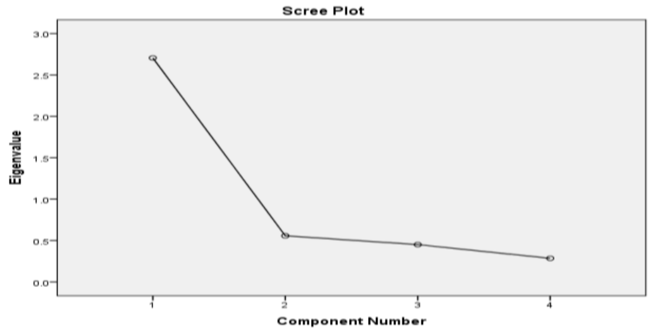


Figure 6.7: Scree plot for compatibility

The results of earlier evaluations suggest that all the items of compatibility are unidimensional.

- ***Complexity***

There were five items used to measure complexity. Details presented in Table 6.15 illustrate the correlation matrix for these items. Table 6.15 shows the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.15 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.15: Correlation and loading matrix for complexity

Correlation and Loading Matrix						
		Complex1	Complex2	Complex3	Complex4	Complex5
Correlation	Complex1	1.000	.762	.573	.490	.579
	Complex2	.762	1.000	.579	.514	.563
	Complex3	.573	.579	1.000	.647	.414
	Complex4	.490	.514	.647	1.000	.415
	Complex5	.579	.563	.414	.415	1.000
Loading		.858	.861	.801	.757	.731

It can be seen from Table 6.16 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.816, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with p<.05 (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.16: KMO and Bartlett's Test for complexity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.816
Bartlett's Test of Sphericity	Approx. Chi-Square	1153.211
	df	10
	Sig.	.000

Table 6.17 indicates that there was one component with an eigenvalue of 3.226. As demonstrated in Figure 6.8, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.17: Eigenvalue for complexity

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	3.226	64.521	64.521	3.226	64.521	64.521
2	.717	14.342	78.863			
3	.486	9.724	88.587			
4	.334	6.680	95.266			
5	.237	4.734	100.00			
Extraction Method: Principal Component Analysis						

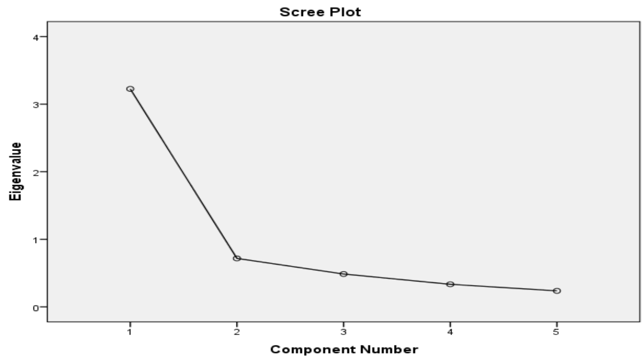


Figure 6.8: Scree plot for complexity

The results of earlier evaluations, suggest that all the items of complexity are unidimensional.

- ***Cost***

There were six items used to measure cost. Detail presented in Table 6.18 illustrates the correlation matrix for these items. Table 6.18 suggests that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.18 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.18: Correlation and loading matrix for cost

Correlation and Loading Matrix							
		Cost1	Cost2	Cost3	Cost4	Cost5	Cost6
Correlation	Cost1	1.000	.622	.392	.513	.506	.765
	Cost2	.622	1.000	.557	.394	.761	.470
	Cost3	.392	.557	1.000	.207	.427	.341
	Cost4	.513	.394	.207	1.000	.361	.423
	Cost5	.506	.761	.427	.361	1.000	.428
	Cost6	.756	.470	.341	.423	.428	1.000
Loading		.853	.854	.629	.620	.781	.766

It can be seen from Table 6.19 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.768, which is greater than the acceptable range 0.50 (Hair et al,. 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.19: KMO and Bartlett's Test for cost

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.768
Bartlett's Test of Sphericity	Approx. Chi-Square	1411.716
	Df	15
	Sig.	.000

Table 6.20 suggests that there was one component with an eigenvalue of 3.436. As demonstrated in Figure 6.9, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.20: Eigenvalue for cost

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	3.436	57.259	57.259	3.436	57.259	57.259
2	.928	15.461	72.720			
3	.645	10.749	83.469			
4	.560	9.329	92.799			
5	.259	4.318	97.116			
6	.173	2.884	100.00			
Extraction Method: Principal Component Analysis						

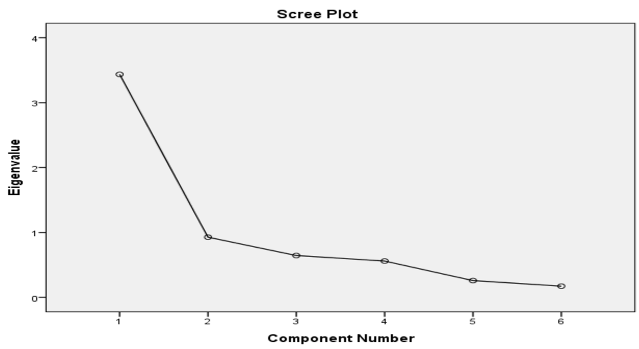


Figure 6.9: Scree plot for cost

The results of earlier evaluations, suggest that all the items of cost are unidimensional.

- ***Security Concern***

There were nine items used to measure security concern. Detail presented in Table 6.21 illustrates the correlation matrix for these items. Table 6.21 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.21 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.21: Correlation and loading matrix for security concern

Correlation and Loading Matrix										
		SecC1	SecC2	SecC3	SecC4	SecC5	SecC6	SecC7	SecC8	SecC9
Correlation	SecC1	1.000	.467	.480	.484	.405	.348	.424	.471	.455
	SecC2	.467	1.000	.511	.467	.219	.453	.445	.353	.535
	SecC3	.480	.511	1.000	.695	.593	.485	.708	.676	.642
	SecC4	.484	.467	.695	1.000	.634	.490	.706	.703	.642
	SecC5	.405	.219	.593	.634	1.000	.383	.645	.840	.539
	SecC6	.348	.453	.485	.490	.383	1.000	.547	.449	.465
	SecC7	.424	.445	.708	.706	.645	.547	1.000	.823	.685
	SecC8	.471	.353	.676	.703	.840	.449	.823	1.000	.661
	SecC9	.455	.535	.642	.642	.539	.465	.685	.661	1.000
Loading		.632	.615	.841	.847	.773	.649	.875	.877	.814

It can be seen from Table 6.22 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.893, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.22: KMO and Bartlett's Test for security concern

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	2974.306
	Df	36
	Sig.	.000

Table 6.23 indicates that there was one component with an eigenvalue of 5.420. As demonstrated in Figure 6.10, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.23: Eigenvalue for security concern

Total Variance Explained						
Component	**Initial Eigenvalues**			**Extraction Sums of Squared**		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	5.420	60.225	60.225	5.420	60.225	60.225
2	.998	11.086	71.311			
3	.671	7.460	78.771			
4	.540	5.998	84.769			
5	.369	4.097	88.866			
6	.330	3.668	92.534			
7	.303	3.371	95.905			
8	.271	3.013	98.917			
9	.097	1.083	100.00			
Extraction Method: Principal Component Analysis						

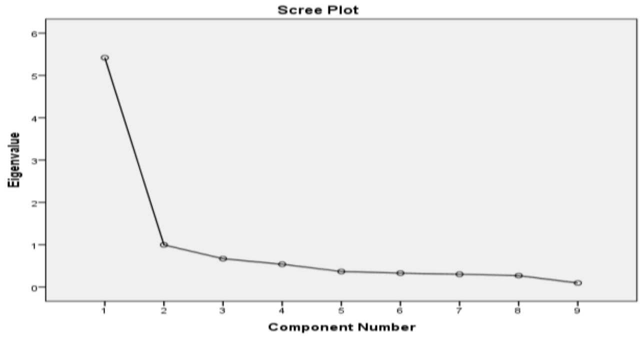


Figure 6.10: Scree plot for security concern

The results of earlier evaluations confirm that all the items of security concern are unidimensional.

- ***Top Management Support***

There were four items used to measure top management support. Details presented in Table 6.24 illustrate the correlation matrix for these items. Table 6.24 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.24 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.24: Correlation and loading matrix for top management support

Correlation and Loading Matrix					
		TMS1	TMS2	TMS3	TMS4
Correlation	TMS1	1.000	.569	.459	.527
	TMS2	.569	1.000	.434	.476
	TMS3	.459	.434	1.000	.695
	TMS4	.527	.476	.695	1.000
Loading		.791	.762	.811	.848

It can be seen from Table 6.25 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.742, which is greater than the acceptable range 0.50 (Hair et al. 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.25: KMO and Bartlett's Test for top management support

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.742
Bartlett's Test of Sphericity	Approx. Chi-Square	704.651
	df	6
	Sig.	.000

Table 6.26 indicates that there was one component with an eigenvalue of 2.583. As demonstrated in Figure 6.11, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.26: Eigenvalue for top management support

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	2.583	64.583	64.583	2.583	64.583	64.583
2	.688	17.203	81.786			
3	.430	10.757	92.543			
4	.298	7.457	100.00			
Extraction Method: Principal Component Analysis						

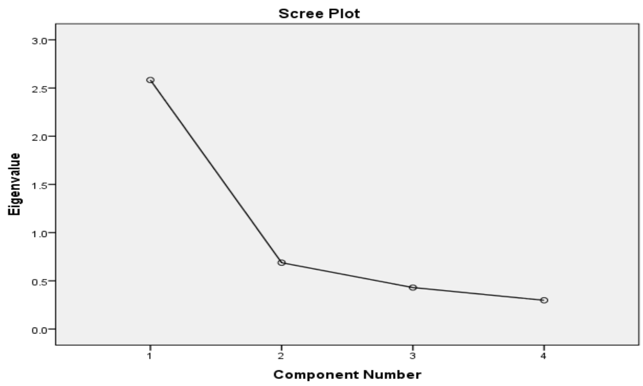


Figure 6.11: Scree plot for top management support

The results of earlier evaluations confirm that all the items of top management support are unidimensional.

- ***Organisation Size***

There were five items used to measure organisation size. Detail presented in Table 6.27 illustrates the correlation matrix for these items. Table 6.27 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.27 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.27: Correlation and loading matrix for organisation size

Correlation and Loading Matrix						
		OZ1	OZ2	OZ3	OZ4	OZ5
Correlation	OZ1	1.000	.856	.511	.393	.424
	OZ2	.856	1.000	.493	.377	.381
	OZ3	.511	.493	1.000	.462	.302
	OZ4	.393	.377	.462	1.000	.131
	OZ5	.424	.381	.302	.131	1.000
Loading		.892	.874	.743	.609	.564

It can be seen from Table 6.28 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.727, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.28: KMO and Bartlett's Test for organisation size

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.727
Bartlett's Test of Sphericity	Approx. Chi-Square	1022.411
	df	10
	Sig.	.000

Table 6.29 shows that there was one component with an eigenvalue of 2.802. As demonstrated in Figure 6.12, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.29: Eigenvalue for organisation size

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.802	56.036	56.036	2.802	56.036	56.036
2	.906	18.121	74.156			
3	.652	13.038	87.194			
4	.498	9.969	97.163			
5	.142	2.837	100.00			
Extraction Method: Principal Component Analysis						

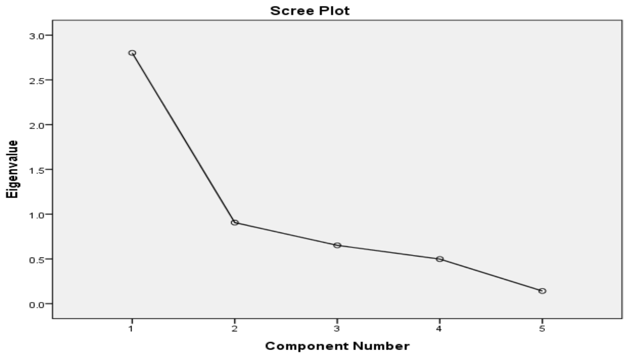


Figure 6.12: Scree plot for organisation size

The results of earlier evaluations confirm that all the items of organisation size are unidimensional.

- ***Employees' Knowledge***

There were four items used to measure employees' knowledge. Detail presented in Table 6.30 illustrates the correlation matrix for these items. Table 6.30 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.30 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.30: Correlation and loading matrix for employees' knowledge

Correlation and Loading Matrix					
		EK1	EK2	EK3	EK4
Correlation	EK1	1.000	.434	.444	.444
	EK2	.434	1.000	.468	.723
	EK3	.444	.468	1.000	.510
	EK4	.444	.723	.510	1.000
Loading		.711	.843	.754	.860

It can be seen from Table 6.31 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.745, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.31: KMO and Bartlett's Test for employees' knowledge

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.745
Bartlett's Test of Sphericity	Approx. Chi-Square	664.503
	df	6
	Sig.	.000

Table 6.32 shows that there was one component with an eigenvalue of 2.523. As demonstrated in Figure 6.13, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.32: Eigenvalue for employees' knowledge

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	2.523	63.072	63.072	2.523	63.072	63.072
2	.656	16.411	79.483			
3	.546	13.661	93.144			
4	.274	6.856	100.00			
Extraction Method: Principal Component Analysis						

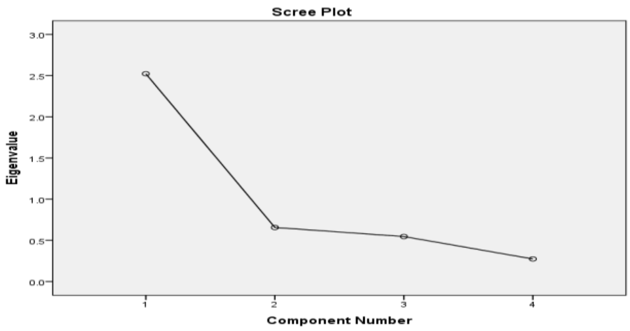


Figure 6.13: Scree plot for employees' knowledge

The results of earlier evaluations confirm that all the items of employees' knowledge are unidimensional.

- ***Government Regulation***

There were seven items used to measure government regulation. Details presented in Table 6.33 illustrate the correlation matrix for these items. Table 6.33 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.33 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.33: Correlation and loading matrix for government regulation

Correlation and Loading Matrix								
		GR1	GR2	GR3	GR4	GR5	GR6	GR7
Correlation	GR1	1.000	.668	.570	.593	.388	.307	.312
	GR2	.668	1.000	.659	.579	.305	348	.338
	GR3	.570	.659	1.000	.551	.360	.324	.397
	GR4	.593	.579	.551	1.000	.409	.436	.464
	GR5	.388	.305	.360	.409	1.000	.429	.340
	GR6	.307	.348	.324	.436	.429	1.000	.322
	GR7	.312	.338	.397	.464	.340	.322	1.000

Loading	.785	.800	.786	.815	.616	.600	.608

It can be seen from Table 6.34 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.854, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.34: KMO and Bartlett's Test for government regulation

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.854
Bartlett's Test of Sphericity	Approx. Chi-Square	1271.434
	df	21
	Sig.	.000

Table 6.35 indicates that there was one component with an eigenvalue of 3.647. As demonstrated in Figure 6.14, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.35: Eigenvalue for government regulation

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	3.647	52.097	52.097	3.647	52.097	52.097
2	.948	13.544	65.641			
3	.707	10.106	75.746			
4	.589	8.416	84.162			
5	.452	6.549	90.621			
6	.369	5.272	95.893			
7	.287	4.107	100.00			
Extraction Method: Principal Component Analysis						

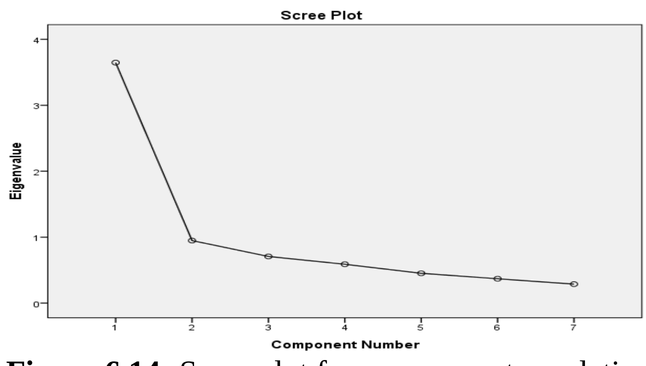


Figure 6.14: Scree plot for government regulation

The results of earlier evaluations confirm that all the items of government regulation are unidimensional.

- ***Information Intensity***

There were four items used to measure information intensity. Details presented in Table 6.36 illustrate the correlation matrix for these items. Table 6.36 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.36 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.36: Correlation and loading matrix for information intensity

Correlation and Loading Matrix					
		InfoI1	InfoI2	InfoI3	InfoI4
Correlation	InfoI1	1.000	.499	.522	.345
	InfoI2	.499	1.000	.573	.349
	InfoI3	.522	.573	1.000	.357
	InfoI4	.345	.349	.357	1.000
Loading		.784	.808	.820	.631

It can be seen from Table 6.37 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.763, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.37: KMO and Bartlett's Test for information intensity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.763
Bartlett's Test of Sphericity	Approx. Chi-Square	475.719
	df	6
	Sig.	.000

Table 6.38 indicates that there was one component with an eigenvalue of 2.338. As demonstrated in Figure 6.15, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.38: Eigenvalue for information intensity

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	2.338	58.447	58.447	2.338	58.447	58.447
2	.726	18.138	76.585			
3	.512	12.799	89.384			
4	.425	10.616	100.00			
Extraction Method: Principal Component Analysis						

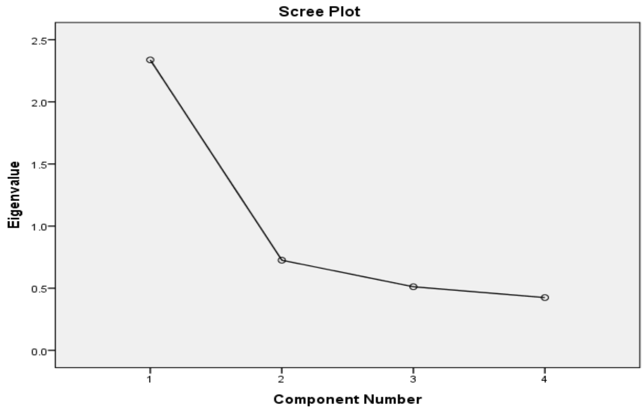


Figure 6.15: Scree plot for information intensity

The results of earlier evaluations confirm that all the items of information intensity are unidimensional.

- ***Anticipated Benefits***

There were fourteen items used to measure anticipated benefits. Details presented in Table 6.3 illustrate the correlation matrix for these items. Table 6.39 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.39 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.39: Correlation and loading matrix for anticipated benefits

Correlation and Loading Matrix															
		AB1	AB2	AB3	AB4	AB5	AB6	AB7	AB8	AB9	AB10	AB11	AB12	AB13	AB14
Correlation	AB1	1.000	.683	.385	.398	.615	.583	.519	.664	.548	.513	.563	.516	.399	.421
	AB2	.683	1.000	.285	.332	.705	.621	.517	.647	.461	.495	.499	.489	.329	.363
	AB3	.385	.285	1.000	.393	.270	.216	.486	.256	.189	.203	.087	.089	.550	.337
	AB4	.398	.332	.393	1.000	.272	.314	.389	.376	.301	.301	.189	.228	.391	.330
	AB5	.615	.705	.270	.272	1.000	.533	.465	.580	.451	.449	.466	.420	.326	.352
	AB6	.583	.621	.216	.314	.533	1.000	.542	.724	.568	.647	.537	.551	.235	.375
	AB7	.519	.517	.486	.389	.465	.542	1.000	.602	.433	.456	.401	.412	.386	.428
	AB8	.664	.647	.256	.376	.580	.724	.602	1.000	.692	.592	.655	.619	.346	.437
	AB9	.548	.461	.189	.301	.451	.568	.433	.692	1.000	.590	.526	.556	.279	.363
	AB10	.513	.495	.203	.301	.449	.647	.456	.592	.590	1.000	.500	.451	.231	.303
	AB11	.563	.499	.087	.189	.466	.537	.401	.655	.526	.500	1.000	.613	.325	.403
	AB12	.516	.489	.089	.228	.420	.551	.412	.619	.556	.451	.613	1.000	.290	.317
	AB13	.399	.329	.550	.391	.326	.235	.386	.346	.279	.213	.325	290	1.000	.323
	AB14	.421	.363	.337	.330	.352	.375	.428	.437	.363	.303	.403	.317	.323	1.000
Loading	1	.817	.785	.541	.505	.727	.793	.722	.868	.735	.711	.719	.695	.519	.576
	2	-.147	.738	.748	.456	-.045	-.229	.439	-.173	-.229	.217	-.309	.316	.554	.223

It can be seen from Table 6.40 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.920, which is greater than the acceptable range 0.50 (Hair et al,. 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.40: KMO and Bartlett's Test for anticipated benefits

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.620
Bartlett's Test of Sphericity	Approx. Chi-Square	3706.572
	df	91
	Sig.	.000

Table 6.41 indicates that there were two components with an eigenvalue of 6.812, and 1.565. As demonstrated in Figure 6.16, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.41: Eigenvalue for anticipated benefits

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	6.812	48.658	48.658	6.812	48.658	48.658
2	1.565	11.177	59.835	1.565	11.177	59.835
3	.801	5.722	65.557			
4	.754	5.386	70.944			
5	.682	4.873	75.816			
6	.624	4.457	80.273			
7	.510	3.645	83.918			
8	.440	3.144	87.062			
9	.382	2.726	89.789			
10	.371	2.650	92.438			
11	.331	2.368	94.806			
12	.282	2.013	96.819			
13	.248	1.773	98.593			
14	.197	1.407	100.00			
Extraction Method: Principal Component Analysis						

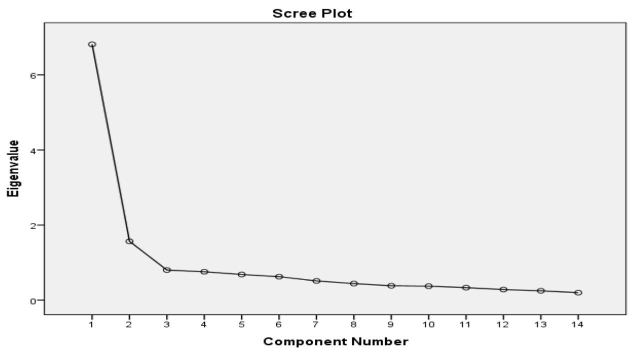


Figure 6.16: Scree plot for anticipated benefits

The results of earlier evaluations confirm that all the items of anticipated benefits are unidimensional.

- ***Cloud Computing Adoption***

There were three items used to measure cloud adoption. Details presented in Table 6.42 illustrate the correlation and loading matrix for these items. Table 6.42 indicates that all the correlation coefficients of these items are greater than 0.30, which shows the suitability for FA of these items (Henson & Roberts, 2006; Tabachnick & Fidell, 2007). The factor loading should be greater than 0.50, and as shown in Table 6.42 the loading of these items is greater than 0.50, which goes beyond the cut-off level (Hair et al., 2005; Zhang et al., 2000).

Table 6.42: Correlation and loading matrix for cloud adoption

Correlation and Loading Matrix				
		Adopt1	Adopt2	Adopt3
Correlation	Adopt1	1.000	.660	.448
	Adopt2	.660	1.000	.478
	Adopt3	.448	.478	1.000
Loading		.858	.871	.753

It can be seen from Table 6.43 that KMO and Bartlett's Test of Sphericity were determined. The value of the KMO is about 0.665, which is greater than the acceptable range 0.50 (Hair et al., 1995). The Bartlett's Test of Sphericity is highly significant with $p<.05$ (Tabachnick & Fidell, 2007). The provided data of this construct is considered to be suitable for FA.

Table 6.43: KMO and Bartlett's Test for cloud adoption

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.665
Bartlett's Test of Sphericity	Approx. Chi-Square	416.766
	df	3
	Sig.	.000

Table 6.44 indicates that there was one component with an eigenvalue of 2.064. As demonstrated in Figure 6.17, the screen plot confirms the results of eigenvalue (Henson & Roberts, 2006; Thompson, 2004).

Table 6.44: Eigenvalue for cloud adoption

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %
1	2.064	68.790	68.790	2.064	68.790	68.790
2	.598	19.932	88.722			
3	.338	11.278	100.00			
Extraction Method: Principal Component Analysis						

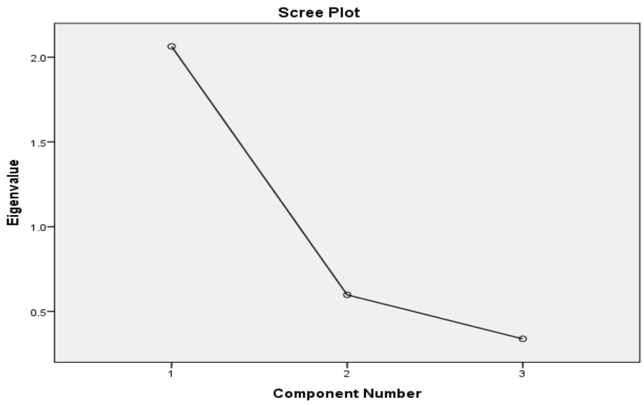


Figure 6.17: Scree plot for cloud adoption

The results of earlier evaluations confirm that all the items of cloud adoption are unidimensional.

- ***Summary of the EFA Results***

Table 6.45 summaries the significant results of the EFA.

Table 6.45: Summary of EFA results

Scale	Factor No.	KMO	Eigen value	Factor Loading														% of variance
				Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	
Compatibility	1	.790	2.705	.840	.872	.763	.810											67.622
Complexity	1	.816	3.226	.858	.861	.801	.757	.731										64.521
Cost	1	.768	3.436	.853	.854	.629	.620	.781	.766									57.259
Security concern	1	.893	5.420	.632	.615	.841	.847	.773	.649	.875	.877	.814						60.225
Top management support	1	.742	5.583	.791	.762	.811	.848											64.583
Organisation size	1	.727	2.802	.892	.874	.743	.609	.564										56.036
Employees' knowledge	1	.745	2.523	.711	.843	.754	.860											63.072
Government regulation	1	.854	3.647	.785	.800	.786	.815	.616	.600	.608								52.097
Information intensity	1	.763	2.338	.784	.808	.820	.631											58.447
Anticipated benefit	1 2	.920	6.812 1.565	.817 -.147	.785 .738	.541 .748	.505 .456	.727 -.045	.793 -.229	.722 .439	.868 -.173	.735 -.229	.711 .217	.719 -.309	.695 .316	.519 .554	.576 .223	48.658 11.177
Cloud adoption	1	.665	2.064	.858	.871	.753												68.790

6.7.1.2 Confirmatory Factor Analysis (CFA)

CFA is basically employed to assess a suggested theory and is an arithmetical methodology. CFA is also a type of SEM (Swisher et al., 2004). Contrary to EFA, CFA has suppositions and prospects established on priori theory regarding the number of factors, and which factor theories or models are more appropriate (best fit) (Swisher et al., 2004; Thompson, 2004).

- ***Measure of Fit***

The utilisation of SEM in the business literature has been increasing in the past few years. Three types of SEM are known which are: the first type is measurement models; the second one is structural models; and the final one is combination of the first and the second models (measurement and structural) (McQuitty, 2004; Anderson & Gerbing, 1988). This research employed the third type of SEM for evaluating the proposed model, because this type of SEM uses both measurement and structural parameters for complete test of the proposed model. SEM refers to a quantitative data assessment tool which identifies, evaluates, and experiments theoretical relationships between observed endogenous constructs and unobserved exogenous constructs (Byrne, 2001). In the first step, model identification is described in the SEM approach, which further relates the influence constructs have on each other and their dimensions (Kline, 2005). A method of visual demonstration of measurement arrangement and theoretical hypothesis consisting of data, the developed model and the relevant theory, is known as specification (Diamantopoulos & Siguaw, 2000). In the valuation process, SEM gives rise to regression weight, variances, covariance, and correlations during its repetitive stages which conjoin each other as per the standard measures (Holmes-Smith et al., 2004).

It is important to carry out the procedure of estimation as it allows the researcher to evaluate the appropriate facts and figures and decide whether the suggested model is appropriate for such kind of data or any kind of variation is needed to enhance its suitability. Following are the three types of measurement in which the model fit statistics have been categorised: absolute fit indices; comparative fit indices; and indices of model parsimony (Byrne, 2001; Cunningham, 2008; Hair et al., 2006; Kline, 2005). It is important to be note that for suitability, there are various fit indices and several rules of thumb regarding the minimum range of value in these types of measurement (Byrne, 2001). In this research, CMIN/DF, RMR, GFI, AGFI, RMSEA, IFI, TLI, and CFI are taken in to account for this analysis as these are employed frequently and are mentioned in the literature (Byrne, 1998; Hulland et al., 1996). The significance of these measurement indices and the description of an applicable level for better suitability for this particular research are illustrated in Table 6.46.

Table 6.46: Summary of goodness of fit indices reported in this research

Goodness of Fit Indices				
Name of index	**Code**	**Level**	**Fit Measures' Indications**	**Sources**
Normed Chi Square (CMIN)	**CMIN/DF**	**≤ 5.0**	Lower limit is 1.0, upper limit is 3.0 or as high as 5.0.	Bollen (1989); Hair et al. (1998); Tabachnick & Fidell (2001); Carmines & McIver (1981); Wheaton et al. (1977)
Root Mean Square Residual (RMR)	**RMR**	**<.06**	A value less than .06 indicates a perfect fit.	Byrne (2001); Hu & Bentler (1995); Joreskog & Sorbom (1989)
Goodness-of-Fit (GFI)	**GFI**	**≥.90**	A value close to 0 indicates a poor fit, while a value close to 1 indicates a perfect fit.	Byrne (1989); Hair et al. (1998)
Adjusted Goodness-of-Fit (AGFI)	**AGFI**	**≥.80**	A value close to 0 indicates a poor fit, while value close to 1 indicates a perfect fit.	Hair et al. (1998); Marsh et al (1988)
Root Mean Square Error of Approximation (RMSEA)	**RMSEA**	**≤ .08**	A value should not be greater than 0.1.	Holmes-Smith et al. (2006); Hair et al. (2006); Browne & Cudeck (1993)
Incremental Index of Fit (IFI)	**IFI**	**≥.90**	A value close to 1 indicates a good fit.	Bollen (1989); Byrne (2001)
Tucker-Lewis Index (TLI)	**TLI**	**≥.90**	A value close to 1 indicates a good fit.	Hair et al. (1998); Marsh et al. (1988); Finch & West (1997)
Comparative Fit Index (CFI)	**CFI**	**≥.90**	A value close to 1 indicates a good fit.	Bentler (1992); Byrne (2001); Hair et al. (1998)

The basic objective of these fit indices is to evaluate the initial measurement models and the final structural model that stated in the next sections.

- ***Initial Measurement and Modification of the Proposed Model***

This part of the analysis emphasises the major findings related to the initial measurement fit with CFA. CFA consists of two major tests: evaluation of the uni-dimensionality and appraisal of data set through the verification of basic structure as per the theoretical framework (Mueller, 1996). For the evaluation of the theory and analysing the level of fit, it additionally recommends alteration, simplification and any essential modification in the measurement model (Byrne, 2001; Holmes-Smith et al., 2006).

Even though model identification is pre-requisite of the CFA, adjustment and standardised loadings in AMOS output were the choices to prove the dimensionality of the measurement or to validate the model fit. Modification indices are comprised of variance, covariance, and regression weight. These indices were examined during evaluation of the model fit to get the direction of the modification.

The one factor congeneric measurement model was undertaken using CFA. According to Dragovic (2004) there are three types of measurement models: parallel; tau-equivalent; and congeneric measurement model. In this research, congeneric measurement model was selected to examined eleven single factor congeneric models: (1) compatibility; (2) complexity; (3) cost; (4) security concern; (5) top management support; (6) organisation size; (7) employees' knowledge; (8) government regulation; (9) information intensity; (10) anticipated benefit; (11) cloud adoption. The initial measurement models for each construct measure are discussed next.

- ***Compatibility: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were four items used to measure compatibility. The CFA initial results of the compatibility model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.47. The CFA initial findings that presented in Table 6.47 demonstrates that the compatibility model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.47: Compatibility CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
Compat1	CC is easily connected with the existing IT infrastructure of my organisation.	.80	.81	14.78
Compat2	Using CC is compatible with all aspects of my organisation.	.86	.88	14.92
Compat3	CC is compatible with my organisation's values and beliefs.	.64	.61	13.15
Compat4	CC compatibility is not an issue for my organisation.	.70	.68	
Fit Indices				

	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	7.291	.985	.923	.032	.984	.951	.984	.115
CFA Final Findings	.852	.999	.991	.005	1.000	1.001	1.000	.000

The researcher found that the main reason of the poor fit of the compatibility model is the high standardised residual covariance between Compat3 '*CC is compatible with my organisation's values and beliefs*' and Compat4 '*CC compatibility is not an issue for my organisation*'. According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items (Compat3 and Compat4). The results of this iteration confirmed that the model was a good fit. As shown in Table 6.47, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

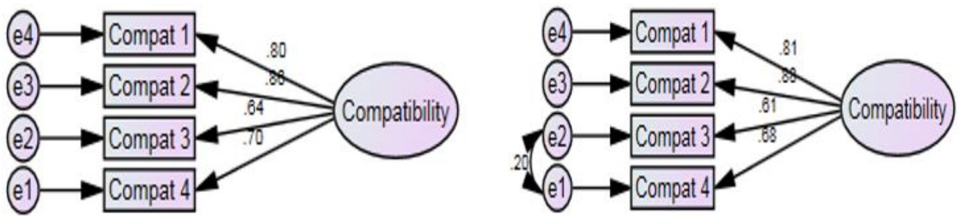


Figure 6.18: Congeneric model of compatibility

- ***Complexity: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were five items used to measure complexity. The CFA initial results of the complexity model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.48. The CFA initial findings that presented in Table 6.48 demonstrates that the complexity model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.48: Complexity CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final	
			Standardised Loadings	C.R. (t)
Complex1	Using CC system is not seen as complex for business operations in my organisation.	.86	.87	15.47
Complex2	The skills needed to adopt CC are not seen as complex for employees in my organisation.	.86	.87	15.47

Complex3	Compared to other types of technologies CC is less complex.	.70	.66	12.51
Complex4	Integration of CC with the existing IT system presents no problems for my organisation.	.63	.58	11.24
Complex5	CC complexity is not an issue for my organisation.	.65	.65	

Fit Indices								
	CMIN/DF	**GFI**	**AGFI**	**RMR**	**IFI**	**TLI**	**CFI**	**RMSEA**
CFA Initial Findings	18.050	.931	.792	.076	.926	.852	.926	.189
CFA Final Findings	1.255	.996	.985	.020	.999	.998	.999	.023

The researcher found that the main reason of the poor fit of the complexity model is the high standardised residual covariance between Complex3 '*Compared to other types of technologies CC is less complex*' and Complex4 '*Integration of CC with the existing IT system presents no problems for my organisation*'. According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items (Complex3 and Complex4). The results of this iteration confirmed that the model was a good fit. As shown in Table 6.48, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

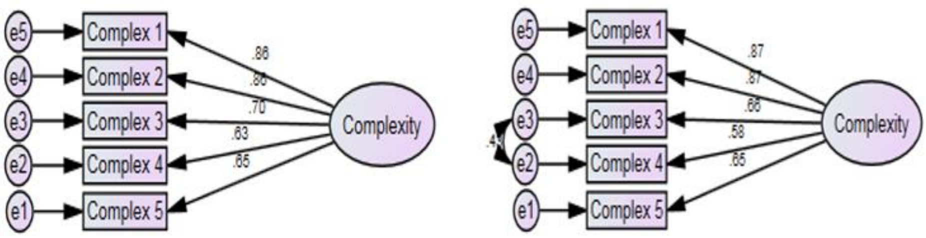


Figure 6.19: Congeneric model of complexity

- ***Cost: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were six items used to measure cost. The CFA initial results of the cost model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.49. The CFA initial findings that presented in Table 6.49 demonstrates that the cost model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.49: Cost CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final	
			Standardised Loadings	C.R. (t)
Cost1	Maintenance costs of CC system are very low.	.79	.91	19.60
Cost2	Energy and environmental costs of CC system are very low.	.85	.71	16.13
Cost3	CC has low training costs.	.57	**Removed**	
Cost4	CC decreases the investment cost in new IT infrastructure.	.52	**Removed**	
Cost5	CC reduces the costs of systems upgrades.	.77	.62	13.85
Cost6	CC is cost effective compared with the other IS technologies.	.68	.80	

Fit Indices

	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	34.016	.814	.565	.082	.789	.648	.789	.263
CFA Final Findings	.843	.998	.991	.011	1.000	1.001	1.000	.000

To improve the mode fit two iteration has been made, the first iteration was examining of the items loading which indicated that the regression weight of Cost4 '*CC decreases the investment cost in new IT infrastructure*' was the lowest with 0.52 among the other items. Based on that, Cost4 was eliminated. The results still showed that the cost model did not achieve a good fit. The second iteration found that Cost3 '*CC has low training costs*' had a high residual covariance with other different items, and especially with Cost1 '*Maintenance costs of CC system are very low*'. The value of the residual covariance for Cost3 and Cost1 was 168.975. As a result of that, the researcher decided to eliminate Cost3 to address this issue and improve the model fit. The results of the second iteration confirmed that the model was a good fit. As shown in Table 6.49, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

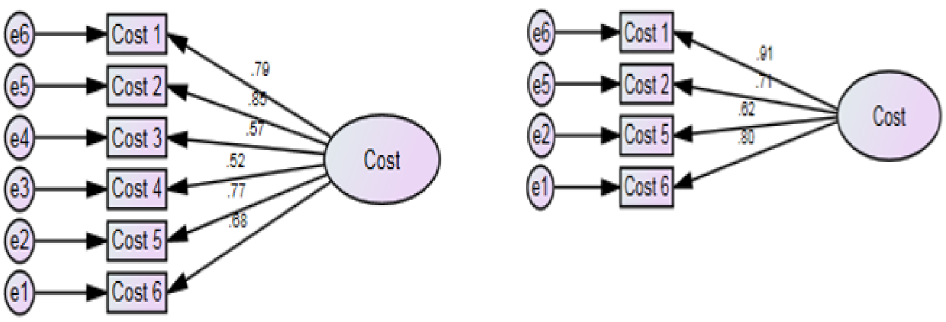


Figure 6.20: Congeneric model of cost

- ***Security Concern: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were nine items used to measure security concern. The CFA initial results of the security concern model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.50. The CFA initial findings that are presented in Table 6.50 demonstrate that the security concern model is not a fit and needs some modification to reach the acceptable level of fit.

Table 6.50: Security concern CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
SecC1	CC provides a sufficient security transfer channel during the process of mass data interchange.	.55	.56	12.44
SecC2	Using CC system solutions is trustworthy.	.51	**Removed**	
SecC3	CC provides a secure service.	.80	.80	19.64
SecC4	Cloud provider data centres provide greater security of data.	.81	.81	19.87
SecC5	Cloud provider data centres have effective redundancy.	.79	**Removed**	
SecC6	Cloud provider data centres have effective backup systems.	.57	.59	13.25
SecC7	Cloud providers maintain the privacy of an organisation's data.	.88	.86	20.36
SecC8	Cloud providers maintain effective data confidentiality.	.90	.83	19.49
SecC9	Security concerns are not an issue with CC.	.77	.79	

Fit Indices

	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	15.644	.823	.704	.072	.867	.822	.867	.175
CFA Final Findings	2.489	.982	.961	.021	.991	.985	.991	.056

To improve the mode fit three iteration has been made, the first iteration was examining of the items loading which indicated that the regression weight of SecC2 '*Using CC system solutions is trustworthy*' was the lowest with 0.51 among the other items. Based on that, SecC2 was eliminated. The results still showed that the security concern model did not achieve a good fit.

The second iteration found that SecC5 '*Cloud provider data centres have effective redundancy*' had a high residual covariance with other different items, and especially with SecC8 '*Cloud providers maintain effective data confidentiality*'. The value of the residual covariance for SecC5 and SecC8 was 163.546. As a result of that, the researcher decided to eliminate SecC5 to address this issue and improve the model fit. But, the results still showed that the security concern model did not achieve a good fit. The third iteration found a high standardised residual covariance between SecC7 '*Cloud providers maintain the privacy of an organisation's data*' and SecC8 '*Cloud providers maintain effective data confidentiality*'. According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items (SecC7 and SecC8). The results of the third iteration confirmed that the model was a good fit. As shown in Table 6.50, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

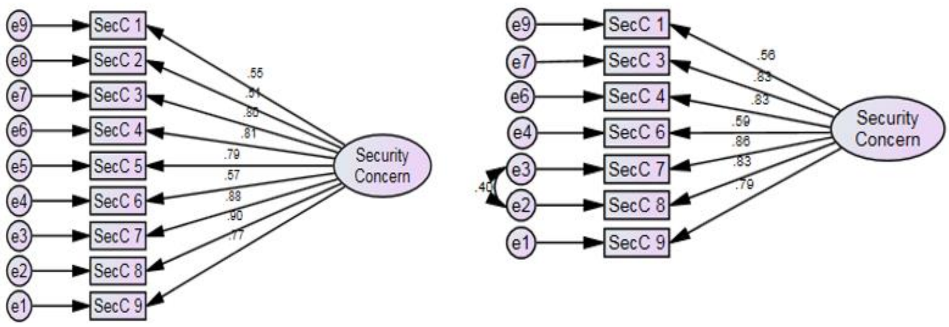


Figure 6.21: Congeneric model of security concern

- ***Top Management Support: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were four items used to measure top management support. The CFA initial results of the top management support model fit pointed out that the model was a poor fit to the data because the cut-off ranges of several fit indices were not in acceptable levels see Table 6.51. The CFA initial findings that presented in Table 6.51 demonstrates that the top management support model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.51: Top management support CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final	
			Standardised Loadings	C.R. (t)
TMS1	Top management is willing to take the risks (financial and organisational) involved in adopting CC.	.65	.59	12.10

TMS2	Top management is seriously considering the adoption of an appropriate cloud system in my organisation.	.61	.54	11.07
TMS3	Top management understands the benefits of CC systems.	.78	.79	14.85
TMS4	Top management provides resources to support the adoption of CC.	.85	.89	

Fit Indices								
	CMIN/DF	**GFI**	**AGFI**	**RMR**	**IFI**	**TLI**	**CFI**	**RMSEA**
CFA Initial Findings	28.270	.943	.713	.045	.923	.767	.922	.239
CFA Final Findings	.402	1.000	.996	.003	1.001	1.005	1.000	.000

The researcher found that the main reason of the poor fit of the top management support model is the high standardised residual covariance between TMS1: '*Top management is willing to take the risks (financial and organisational) involved in adopting CC*' and TMS2 '*Top management is seriously considering the adoption of an appropriate cloud system in my organisation*'. According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items (TMS1 and TMS2). The results of this iteration confirmed that the model was a good fit. As shown in Table 6.51, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

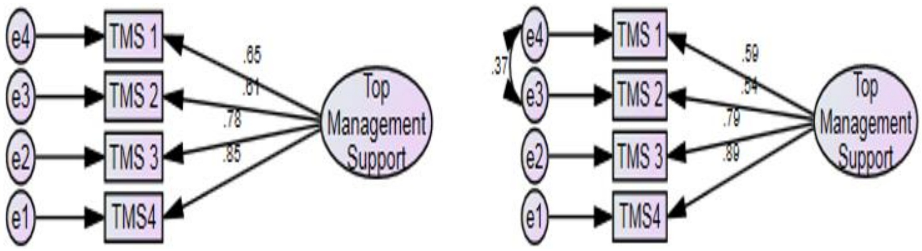


Figure 6.22: Congeneric model of top management support

- ***Organisation Size: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were five items used to measure organisation size. The CFA initial results of the organisation size model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.52. The CFA initial findings that presented in Table 6.52 demonstrates that the organisation size model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.52: Organisation size CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	C.R. (t)
OZ1	The number of employees in my organisation is high compared to others in the industry.	.94	.95	10.03
OZ2	The revenue of my organisation is high compared to others in the industry.	.90	.90	10.09
OZ3	Small organisations are more flexible in adopting CC.	.55	.54	8.29
OZ4	Bigger organisations with larger resources can easily move to adopt CC.	.43	**Removed**	
OZ5	The size of an organisation impacts its adoption of CC.	.44	.44	

Fit Indices

	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	11.173	.958	.875	.076	.950	.900	.950	.146
CFA Final Findings	2.258	.995	.977	.033	.997	.991	.997	.051

To improve the mode fit only one iteration has been made, in this iteration the researcher was examining of the items loading which indicated that the regression weight of OZ4 '*Bigger organisations with larger resources can easily move to adopt CC*' was the lowest with 0.43 among the other items. Based on that, OZ4 was eliminated. The results of this iteration confirmed that the model was a good fit. As shown in Table 6.52, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

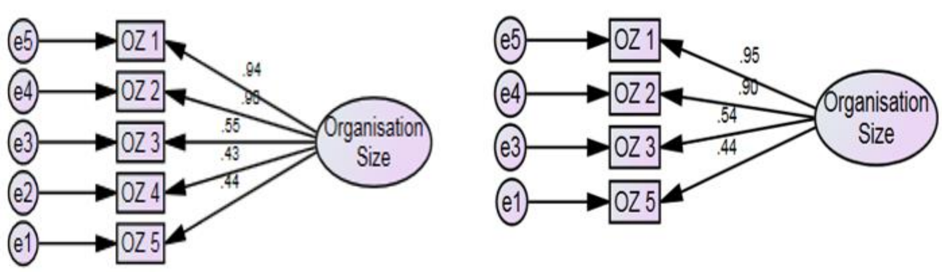


Figure 6.23: Congeneric model of organisation size

- ***Employees' Knowledge: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were four items used to measure employees' knowledge. The CFA initial results of the employees' knowledge model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.53. The CFA initial findings that presented in Table 6.53 demonstrate that the employees' knowledge model is not a fit and needs some modification to reach the acceptable level of fit.

Table 6.53: Employees' knowledge CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
EK1	IT staff in my organisation have the ability to support CC system development.	.54	.51	10.75
EK2	Staff in my organisation have previous IT development experience.	.82	.82	16.06
EK3	Employee knowledge in my organisation plays a massive role in the adoption of CC.	.60	.58	12.18
EK4	Organisations with employees who have more knowledge about CC are likely to more adoption.	.87	.88	

Fit Indices								
	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	9.651	.980	.901	.041	.974	.922	.974	.134
CFA Final Findings	.691	.999	.993	.005	1.000	1.003	1.000	.000

The researcher found that the main reason of the poor fit of the employees' knowledge model is the high standardised residual covariance between EK3 '*Employee knowledge in my organisation plays a massive role in the adoption of CC*' and EK1 '*IS staff in my organisation have the ability to support CC system development*'. According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items (EK3 and EK1). The results of this iteration confirmed that the model was a good fit. As shown in Table 6.53, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

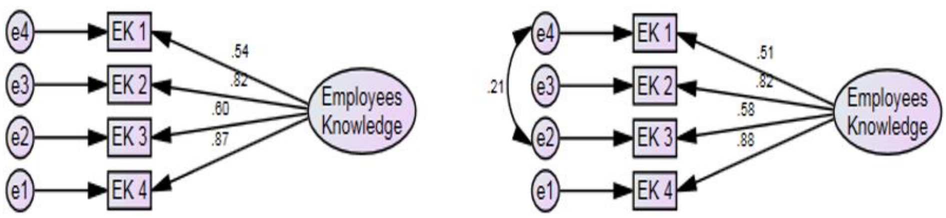


Figure 6.24: Congeneric model of employees' knowledge

- ***Government Regulation: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were seven items used to measure government regulation. The CFA initial results of the government regulation model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.54. The CFA initial findings that presented in Table 6.54 demonstrates that the government regulation model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.54: Government regulation CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
GR1	Government effectively promotes CC adoption.	.77	.79	15.60
GR2	The data protection policies are regulated by government.	.80	.84	16.39
GR3	Government regulations can provide a better process for adopting CC.	.76	.76	15.14
GR4	Current government policy is focused on privacy.	.76	.72	
GR5	Current government policy is focused on security.	.50	**Removed**	
GR6	Current government policy is focused on all of the risk factors.	.48	**Removed**	
GR7	There is no specific government policy on adoption of CC.	.50	**Removed**	

Fit Indices

	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	8.374	.930	.859	.056	.918	.877	.918	.124
CFA Final Findings	4.208	.992	.958	.016	.993	.977	.992	.080

To improve the mode fit only one iteration has been made, in this iteration the researcher was examining of the items loading which indicated that the regression weight of GR6 '*Current government policy is focused on all of the risk factors*' was the lowest with 0.48 among the other items. Based on that GR6 was eliminated. But, the result showed that the government regulation model still did not achieved a good fit. For second time, the researcher was examining of the items loading which indicated that the regression weight of GR5 '*Current government policy is focused on security*' and GR7 '*There is no specific government policy on adoption of CC*' both of the items were the lowest with 0.50 among the other items. Based on that GR5 and GR7 were eliminated. The results of this iteration confirmed that the model was a good fit. As shown in Table 6.54, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

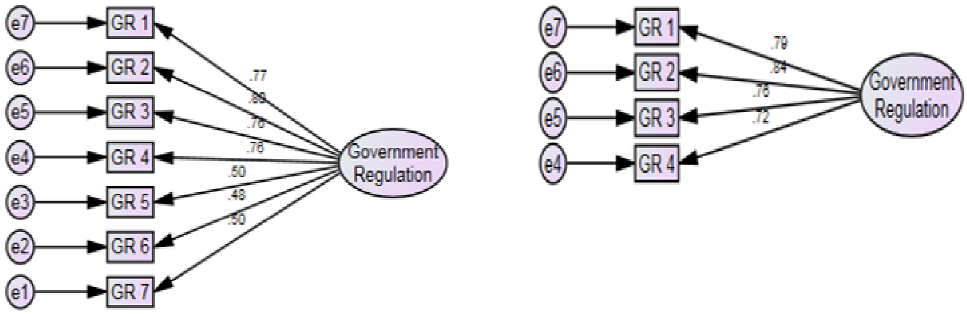


Figure 6.25: Congeneric model of government regulation

- ***Information Intensity: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were four items used to measure information intensity. As shown in Table 6.55, the CFA initial and final findings of the information intensity model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

Table 6.55: Information intensity CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
II1	The users and organisations in the same industries as my organisation rely on each other for information regarding services.	.68	.68	8.82
II2	Users have access to sufficient information on how to use services.	.74	.74	9.06
II3	Organisations in the same sector as my organisation can access sufficient information to support a change in services provided.	.77	.77	9.13
II4	My organisation is dependent on up-to-date information.	.48	.48	

Fit Indices	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	.366	.999	.996	.004	1.003	1.008	1.000	.000
CFA Final Findings	.366	.999	.996	.004	1.003	1.008	1.000	.000

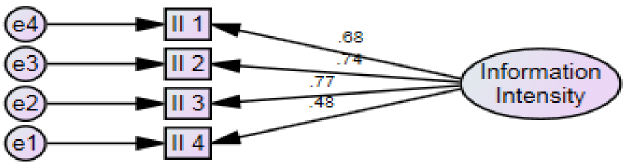


Figure 6.26: Congeneric model of information intensity

- ***Anticipated Benefit: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were fourteen items used to measure anticipated benefit. The CFA initial results of the anticipated benefit model fit pointed that the model was poor fit to the data because the cut-off range of several fit indices were not in acceptable levels see Table 6.56. The CFA initial findings that presented in Table 6.56 demonstrates that the anticipated benefit model is not fit and needs some modification to reach the acceptable level of fit.

Table 6.56: Anticipated benefit CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
AB1	Using CC system provides better services.	.79	.75	10.84
AB2	Using CC system speeds up application processes.	.77	**Removed**	
AB3	Using CC system improves data accuracy.	.36	**Removed**	
AB4	Using CC system improves flexibility.	.44	**Removed**	
AB5	Using CC system improves availability of services.	.70	.65	10.06
AB6	Using CC system improves storage capacity.	.79	.80	11.19
AB7	Using CC system improves security of data.	.68	.65	10.12
AB8	Using CC system reduces the level of risk.	.88	.90	11.70
AB9	Using CC system improves disaster recovery and backup.	.72	.75	10.87
AB10	Using CC system provides cost reductions.	.69	.70	10.52
AB11	Using CC system reduces IT infrastructure.	.71	.73	10.69
AB12	Using CC system provides remote access.	.68	.70	10.50
AB13	Using CC system reduces staff.	.44	**Removed**	
AB14	Using CC system provides time efficiencies.	.52	.50	

Fit Indices

	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	8.685	.815	.748	.083	.839	.809	.838	.127
CFA Final Findings	4.033	.949	.917	.027	.960	.947	.960	.080

To improve the mode fit three iterations has been made, the first iteration was examining of the items loading which indicated that the regression weight of AB3 '*Using CC system improves data accuracy*' is about 0.38, AB4 '*Using CC system improves flexibility*', and AB13 '*Using CC system reduces staff*' both of them with regression weight about 0.44 among the other items. Based on that AB3, AB4, and AB13 were eliminated. The results still showed that the anticipated benefit model did not achieve a good fit.

The second iteration found that AB2 '*Using CC system speeds up application processes*' had a high residual covariance with other different items, and especially with AB5 '*Using CC system improves availability of services*'. The value of the residual covariance for AB2 and AB5 was 68.609. As a result of that, the researcher decided to eliminate AB2 to address this issue and improve the model fit. But the results still showed that the anticipated benefit model did not achieved a good fit.

The third iteration found a high standardised residual covariance between AB1 '*Using CC system provides better services*' and AB5 '*Using CC system improves availability of services*'. According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items (AB1 and AB5). The results of the third iteration confirmed that the model was a good fit. As shown in Table 6.56, the CFA final findings of the model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

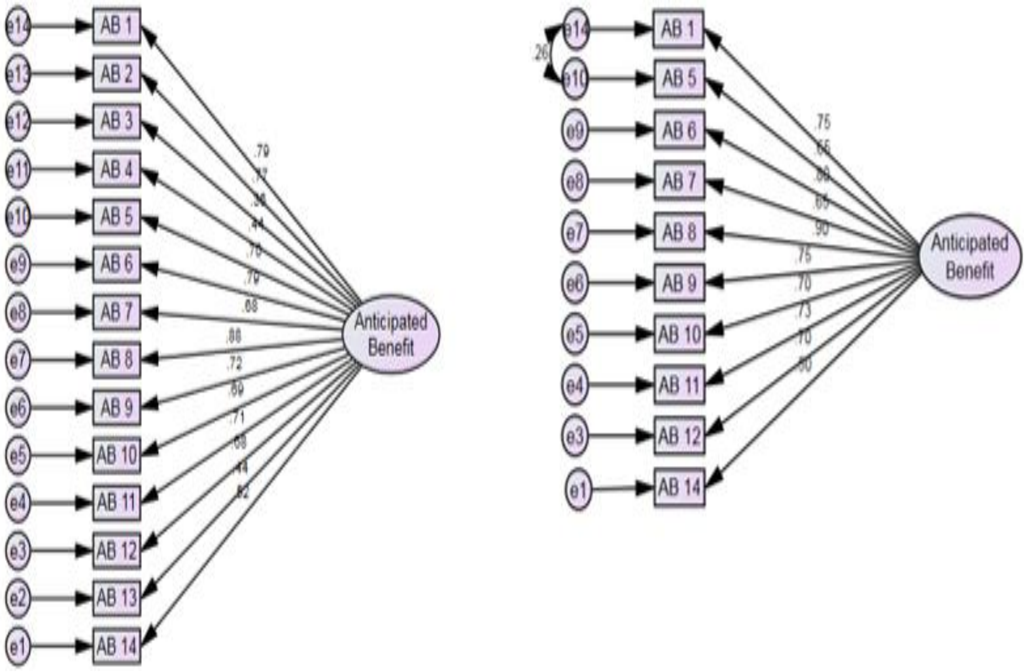


Figure 6.27: Congeneric model of anticipated benefit

- ***Cloud Computing Adoption: CFA Initial Findings***

At the first iteration of conducting one factor congeneric measurement, there were three items used to measure cloud adoption. As shown in Table 6.57, the CFA initial and final findings of the cloud adoption model fit indicated and confirmed that the measurement model achieved a good fit and all the different indicators that were reported in this research met the recommended levels.

Table 6.57: Cloud Adoption CFA initial findings

Items	Items wording	Initial Standardised Loadings	Final Standardised Loadings	Final C.R. (t)
Adopt1	Communications (email, telephone services, web conferencing, social networking, media monitoring).	79	79	9.88
Adopt2	Data storage (security, data backup, disaster recovery).	84	84	10.18
Adopt3	Office productivity (file sharing, collaboration software, management, human resources).	27	57	

Fit Indices	CMIN/DF	GFI	AGFI	RMR	IFI	TLI	CFI	RMSEA
CFA Initial Findings	.819	.999	.991	.005	1.000	1.002	1.000	.000
CFA Final Findings	.819	.999	.991	.005	1.000	1.002	1.000	.000

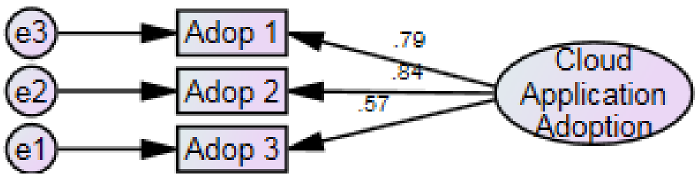


Figure 6.28: Congeneric model of cloud adoption

Table 6.58 showed the items that have been removed in the one factor congeneric measurement model. All eleven constructs in the research proposed model were evaluated individually using this technique and the best fit of each congeneric measurement model was achieved.

Table 6.58: Summary of Congeneric Measurement

Construct	No. Items Input	No. Items Output	Eliminated Items
Compatibility	4	4	= = = =
Complexity	5	5	= = = =
Cost	6	4	Cost3, Cost4
Security Concern	9	7	SecC2, SecC5
Top Management Support	4	4	= = = =
Organisation Size	5	4	OZ4
Employees' Knowledge	4	4	= = = =
Government Regulation	7	4	GR5, GR6, GR7
Information Intensity	4	4	= = = =
Anticipated Benefit	14	10	AB2, AB3, AB4, AB13
Cloud Adoption	3	3	= = = =
Total	**65**	**53**	**= = = =**

- ***Overall Measurement Model Fit***

All constructs that presented in the research proposed model have been subjected to evaluation with respect to individual measurement model fit. In this process 12 items have been removed from the individual models as illustrated in Table 6.58. The objective behind removing these 12 items was to accomplish an enhanced fit to the data in this procedure. An overall measurement model fit has been established with the intention of evaluating the competence of the measurement model, which tested the covariance structures for all constructs. Initially, as showed in Figure 6.29, almost 53 items were assessed in the overall measurement model.

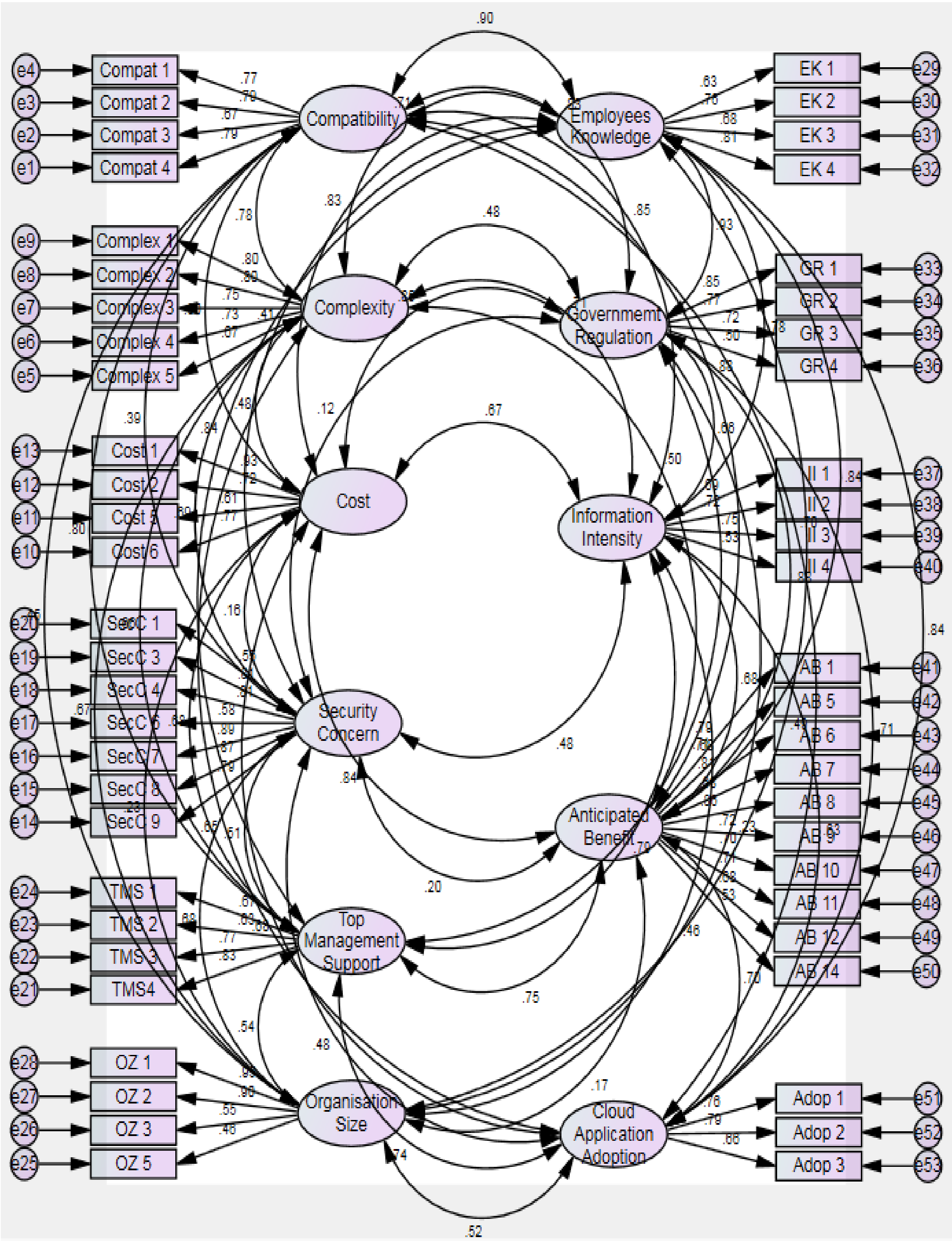


Figure 6.29: Initial overall measurement model fit

The results of the overall measurement model fit are presented in Table 6.59. These results indicated that the model was not appropriate (poor) fit to the data because the cut-off ranges for the fit indices were not in acceptable level.

Table 6.59: Overall measurement CFA initial model findings

Indices	Initial Model (53 Items)	Conclusion
CMIN/DF	4.363	Acceptable
RMR	.134	Not Acceptable
GFI	.666	Not Acceptable
AGFI	.624	Not Acceptable
IFI	.779	Not Acceptable
TLI	.758	Not Acceptable
CFI	.777	Not Acceptable
RMSEA	.084	Acceptable

Based on the results of the overall measurement model fit presented in Table 6.59, there were a number of alterations have been made to improve the overall measurement model fit. The first iteration was examining of the items loading which indicated that the regression weight of (SecC1, OZ3, OZ5, GR4, and AB14) was the lowest among the other items in the research proposal model. Because of the low loading of these items the researcher decided to eliminate them to improve the overall measurement model fit. The overall results improved with this change, but still showed that the overall measurement model did not achieve a good fit.

In the second iteration the researcher found that there was a high residual covariance between some items such as (SecC8, Compat4, SecC9, Complex5, AB1, Cost2, AB7, EK1, Complex3, and Complex4). As a result of the high residual covariance of the mentioned items on other items in the research proposed model, the researcher decided to eliminate these items to address the issue and improve the model fit. The results of this iteration showed some improvement of the overall measurement model but still did not achieve a good fit.

In the third iteration the researcher found that there was a high standardised residual covariance between some items such as (TMS1 and TMS2); and (AB11 and AB12). According to Byrne (2001) and Holmes-Smith et al. (2006) state that correlating the error covariance approach can be justified both statistically and substantively. As a result of that, the researcher made covering error variance terms of both items

(TMS1 and TMS2); and (AB11 and AB12). The results of the third iteration confirmed that the model was a good fit.

Table 6.60 showed the items that have been removed in the overall measurement model. All eleven constructs in the research proposed model were evaluated in one model and the best fit of overall measurement model was achieved.

Table 6.60: Summary overall measurement model findings

Construct	No. Items Input	No. Items Output	Eliminated Items
Compatibility	4	3	Compat4
Complexity	5	2	Complex3, Complex 4, Complex 5
Cost	4	3	Cost2
Security Concern	7	4	SecC1, SecC8, SecC9
Top Management Support	4	4	= = = =
Organisation Size	4	2	OZ3, OZ5
Employees' Knowledge	4	3	EK1
Government Regulation	4	3	GR4
Information Intensity	4	4	= = = =
Anticipated Benefit	10	7	AB1, AB7, AB14
Cloud Adoption	3	3	= = = =
Total	**53**	**38**	**= = = =**

About 15 items has been removed from the proposed model to achieve the overall measurement model fit. So, the proposed model achieved the final model fit as demonstrated in Table 6.61 with about 38 items as shown in Figure 6.30.

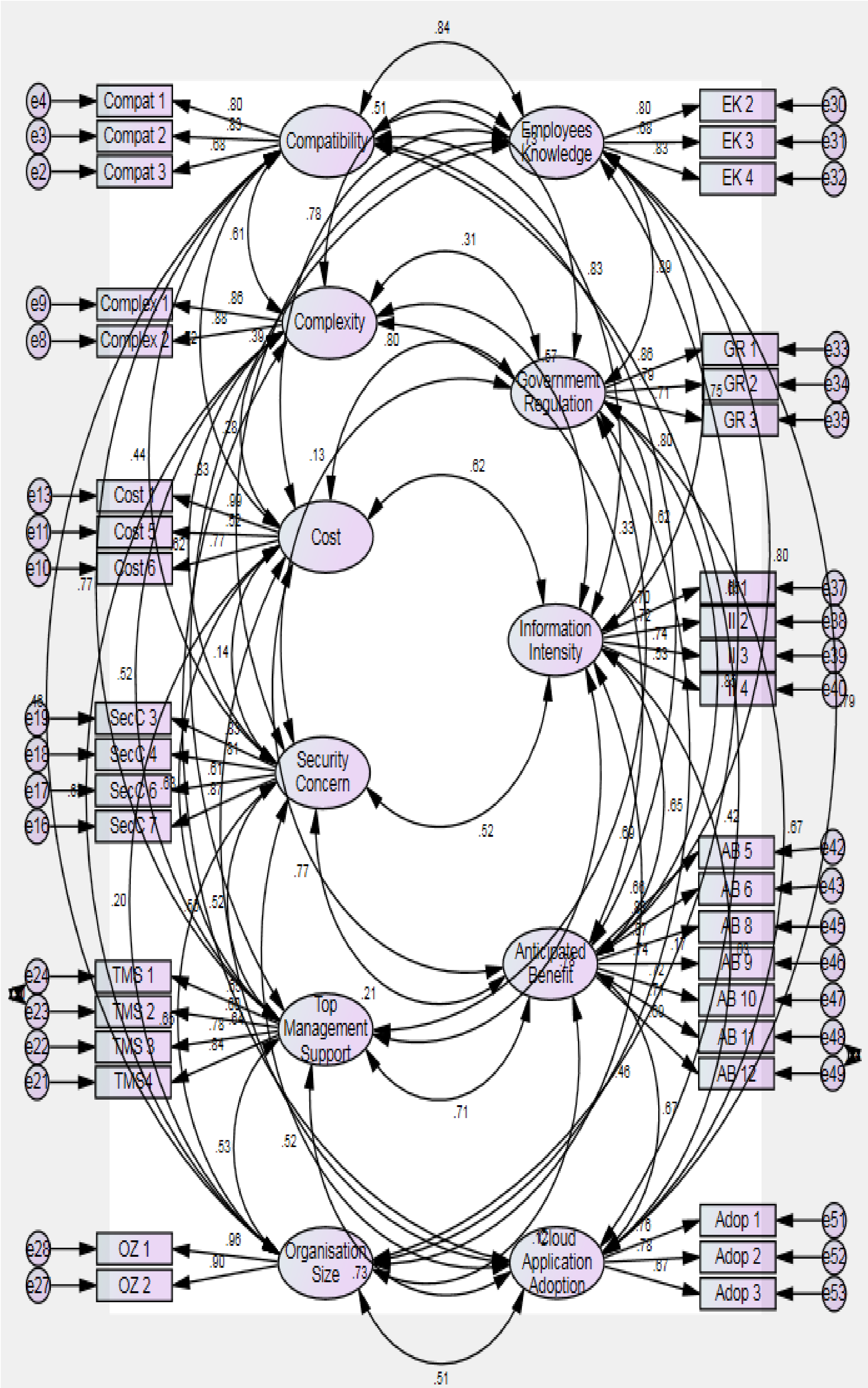


Figure 6.30: Final overall measurement model fit

The results of the final model fit are presented in Table 6.61, these results indicated and confirmed that the overall measurement model fit achieved a good fit and all the different indicators that were reported in this research met the recommended level.

Table 6.61: Overall measurement CFA final model findings

Indices	Final Model (38 Items)	Conclusion
CMIN/DF	2.776	Good
RMR	.052	Good
GFI	.892	Acceptable
AGFI	.811	Good
IFI	.912	Good
TLI	.901	Good
CFI	.911	Good
RMSEA	.061	Good

The fit statistics validates the termination of 15 items from various constructs measures. This helps to enhance the values of the fit indices in the final model of measurement. The alterations that made in the individual measurement model tend to bring significant changes in the model while improving its effectivity. The remaining 38 items in different constructs measures also show significant similarity between data and measurement model.

6.7.2 The Second Statistical Technique

It is very significant to investigate reliability and validity of the measurement model. Because, any negative impact caused by low values of the reliability or validity will affect the quality of data that will used in the next stages of the analysis process. For that reason, it is essential to go through the reliability and validity of the measurement model. To analyse the reliability or validity, the results that were demonstrated from the testing the overall measurement model were used. The tests that employed for the assessment of reliability and validity of the research proposed model is: Cronbach's Alpha (Hair et al., 2006); Construct Reliability (Field, 2009); Squared Multiple Correlation (SMC) (Holmes-Smith, 2011); Convergent Validity (Hair et al., 2006); Construct Validity (Cunningham, 2008). Table 6.62 demonstrate the results of performing CFA to test the overall measurement model.

Table 6.62: CFA measurement model results

Items		Factors	Estimate	S.E.	C.R.	P	SRW	SMC	Cronbach's Alpha	Construct reliability
***Compatibility**										
Compat1	<---	Compatibility	1.230	.078	15.688	***	.804	.647	.802	.803
Compat2	<---	Compatibility	1.547	.096	16.046	***	.826	.683		
Compat3	<---	Compatibility	1.000				.680	.462		
***Complexity**										
Complex1	<---	Complexity	.969	.047	20.528	***	.864	.747	.865	.865
Complex2	<---	Complexity	1.000				.881	.777		
***Cost**										
Cost1	<---	Cost	1.396	.062	22.541	***	.987	.974	.712	.714
Cost5	<---	Cost	.575	.049	11.739	***	.519	.369		
Cost6	<---	Cost	1.000				.773	.598		
***Security Concern**										
SecC3	<---	Security Concern	.875	.040	22.097	***	.831	.691	.861	.860
SecC4	<---	Security Concern	.943	.044	21.430	***	.814	.663		
SecC6	<---	Security Concern	.541	.038	14.369	***	.611	.373		
SecC7	<---	Security Concern	1.000				.866	.751		
***Top Management Support**										
TMS1	<---	Top Management Support	.559	.037	14.931	***	.646	.417	.814	.817
TMS2	<---	Top Management Support	.542	.040	13.657	***	.601	.362		
TMS3	<---	Top Management Support	.817	.043	19.024	***	.776	.603		
TMS4	<---	Top Management Support	1.000				.844	.712		
***Organisation Size**										
OZ1	<---	Organisation Size	1.110	.039	28.209	***	.956	.914	.922	.923
OZ2	<---	Organisation Size	1.000				.896	.802		
***Employees' Knowledge**										
EK2	<---	Employees' Knowledge	.748	.037	20.327	***	.796	.633	.791	.797
EK3	<---	Employees' Knowledge	.750	.046	16.220	***	.676	.456		
EK4	<---	Employees' Knowledge	1.000				.831	.691		

***Government Regulation**										
GR1	<---	Government Regulation	1.211	.068	17.792	***	.863	.744	.836	.838
GR2	<---	Government Regulation	1.022	.063	16.344	***	.787	.620		
GR3	<---	Government Regulation	1.000				.712	.507		
***Information Intensity**										
II1	<---	Information Intensity	1.351	.129	10.439	***	.699	.489	.761	.759
II2	<---	Information Intensity	1.494	.141	10.572	***	.716	.513		
II3	<---	Information Intensity	1.692	.157	10.778	***	.745	.555		
II4	<---	Information Intensity	1.000				.699	.378		
***Anticipated Benefit**										
AB5	<---	Anticipated Benefit	1.310	.096	13.608	***	.664	.441	.896	.898
AB6	<---	Anticipated Benefit	1.980	.118	16.717	***	.830	.689		
AB8	<---	Anticipated Benefit	2.111	.121	17.446	***	.871	.759		
AB9	<---	Anticipated Benefit	1.510	.100	15.054	***	.740	.547		
AB10	<---	Anticipated Benefit	1.361	.092	14.721	***	.722	.521		
AB11	<---	Anticipated Benefit	1.219	.073	16.690	***	.710	.503		
AB12	<---	Anticipated Benefit	1.000				.688	.473		
****Cloud Adoption**										
Adopt1	<---	Cloud Adoption	.945	.068	13.922	***	.759	.577	.756	.771
Adopt2	<---	Cloud Adoption	.886	.062	14.235	***	.783	.613		
Adopt3	<---	Cloud Adoption	1.000				.668	.446		

**Exogenous Latent Constructs*

***Endogenous Latent Constructs*

6.7.2.1 Reliability test

Related to the measurement of the reliability there were three tests that used to assess the reliability of the research proposed model: Cronbach's alpha, Construct Reliability, and SMC. Each of these reliability tests will be addressed next.

- ***Cronbach's Alpha***

It is a beneficial and helpful test to evaluate the dependability of the internal consistency (Hair et al., 2006). The recommended acceptable level of this indicator is 0.70 (Field, 2009; Helms et al., 2006; Stafford & Turan, 2011). As demonstrated in Table 6.62, all the constructs in the research proposed model exceeded the acceptable level in the range of 0.922 and 0.712.

- C***onstruct Reliability***

It focuses on the evaluation of the reliability or dependability of each construct. The acceptable level of the construct reliability is 0.70 (Field, 2009; Helms et al., 2006; Stafford & Turan, 2011). The results of construct reliability value of each construct in the research proposed model presented in Table 6.62. The results showed that construct reliability range between 0.712 and 0.922. These value were all above the acceptable level which confirming a high level of reliability.

- ***Squared Multiple Correlation*** *(SMC)*

It is the major indicator when it comes to the evaluation of every item in the research proposed model. According to Holmes-Smith (2011), the suggested value of SMC is >0.30. As demonstrated Table 6.62, about 27 items out of 38 exceeded 0.50, which represents 71 percent of all the items. Seven items were between 0.417 and 0.489, which represents 18 percent of all the items. Only four items were less than 0.4, and these items were between 0.362 and 0.378, which represents 11 percent of all the items. Therefore, the value of SMC presented in Table 6.62 illustrates that all the items used to measure the constructs of the proposed model are dependable.

6.7.2.2 Validity test

Related to the measurement of the validity there were two tests that used to assess the validity of the research proposed model: Convergent Validity; and Construct Validity. Each of these validity tests will be addressed next.

- C***onvergent Validity***

It helps in evaluating the validity of measurement. Convergent validity (Standardised Regression Weights) (SRW) refers to the consistency between the construct and its relative variable. It illustrates the measurement limits of the items being measured. The factor loading of each item having an approximated value of 0.50 or more was considered as a significant validity (Hair et al., 2006; Holmes-Smith, 2001). In this research, the loading values of the factors were between 0.519 and 0.987 as provided in Table 6.62. This range is considered as a standard to measure the validity of the variables. Furthermore, the critical ratios (CR) of the proposed research model items presented in Table 6.62 were between 10.439 and 28.209, which were more than the standard value of 1.96 that provided by Holmes-Smith (2001). This indicates that the proposed research model retains significant regression validity. For more details see Table 6.62.

- C***onstruct Validity***

It is used to measure the validity of indicators to evaluate their constructs. The indices of goodness of fit measures point to construct validity (Cunningham, 2008; Holmes-Smith et al., 2006). The results of one factor congeneric measurement model are illustrated in Table 6.63. The eleven constructs in this research have achieved a good fit and the indices provide evidence of the validity of these constructs.

Table 6.63: One-factor congeneric measurement model results

Constructs	**Fit Indices**							
	CMIN/DF	**GFI**	**AGFI**	**RMR**	**IFI**	**TLI**	**CFI**	**RMSEA**
Compat	.852	.999	.991	.005	1.000	1.001	1.000	.000
Complex	1.255	.996	.985	.020	.999	.998	.999	.023
Cost	.843	.998	.991	.011	1.000	1.001	1.000	.000
SecC	2.489	.982	.961	.021	.991	.985	.991	.056
TMS	.402	1.000	.996	.003	1.001	1.005	1.000	.000
OZ	2.258	.995	.977	.033	.997	.991	.997	.051
EK	.691	.999	.993	.005	1.000	1.003	1.000	.000
GR	4.208	.992	.958	.016	.993	.977	.992	.080
II	.366	.999	.996	.004	1.003	1.008	1.000	.000
AB	4.033	.949	.917	.027	.960	.947	.960	.080
Adopt	.819	.999	.991	.005	1.000	1.002	1.000	.000

6.8 Structural Model Test

The proposed model in this research was designed to achieve the factors that influence the adoption of CC. In this regard, ten constructs were chosen and evaluate the impact of the adoption of CC.

Arbuckle (2005) pointedout that the structural model is fundamentally a methodology where the part of the model that depicts how the latent variables are connected to each other. To be more particular, Byrne (1999) explained the structural model as the approach employed to figure out those variables who have a direct or indirect effect on the values of other latent variables. The principle of the structure model in the research is to evaluate the links via major paths between latent variables as well as to examine the fundamental hypothesis for providing answers to the research problems highlighted in Chapter 1.

As shown in Table 6.64, the results of the structural model fit indicated and confirmed that the measurement model achieved a good fit and most of the different indicators that were reported in this research met the recommended levels.

Table 6.64: Structural model fit results

Indices	Structural Model Fit	Conclusion
CMIN/DF	2.847	Good
RMR	.055	Good
GFI	.852	Acceptable
AGFI	.807	Good
IFI	.908	Good
TLI	.899	Acceptable
CFI	.907	Good
RMSEA	.062	Good

The results that presented in Table 6.64 highlighted that the structural model achieved a good fit. But, GFI with .852 and TLI with .899 as shown in Table 6.64 were less than the acceptable level which is ≥.90. These results of GFI and TLI appeared to be due to the large sample of the research and also due to the complexity of the research model (Jais, 2007).

The structural model was tested with ten exogenous latent constructs, 35 observed variables and only one endogenous latent construct, 3 observed variables as shown in Figure 6.31.

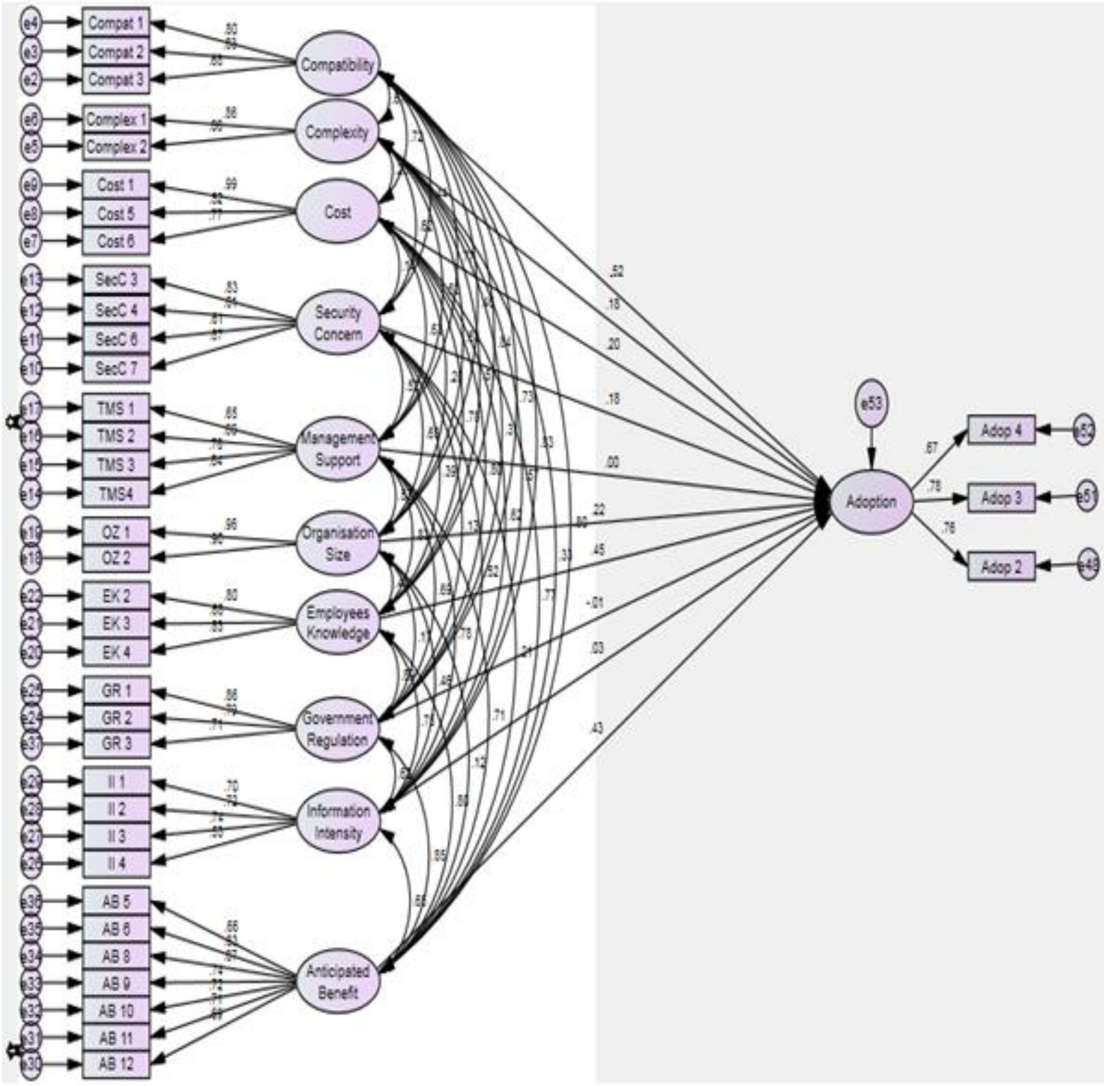


Figure 6.31: Research structural model testing

Table 6.65 illustrates the results of regression analysis among the constructs of the research structural model.

Table 6.65: Regression weights of the structural model

Path			Estimate	S.E.	C.R.	P
Cloud Adoption	<---	Compatibility	**.577**	**.227**	**2.540**	**.011***
Cloud Adoption	<---	Complexity	**.134**	**.056**	**2.405**	**.016***
Cloud Adoption	<---	Cost	**.269**	**.165**	**2.619**	**.009****
Cloud Adoption	<---	Security Concern	**.140**	**.062**	**2.252**	**.024***
Cloud Adoption	<---	Top Management Support	.003	.097	.033	.974
Cloud Adoption	<---	Organisation Size	**.254**	**.155**	**2.815**	**.005****
Cloud Adoption	<---	Employees' Knowledge	.305	.196	1.554	.120
Cloud Adoption	<---	Government Regulation	-.012	.223	-.056	.956
Cloud Adoption	<---	Information Intensity	.057	.229	.250	.803
Cloud Adoption	<---	Anticipated Benefit	**.678**	**.252**	**2.692**	**.007****

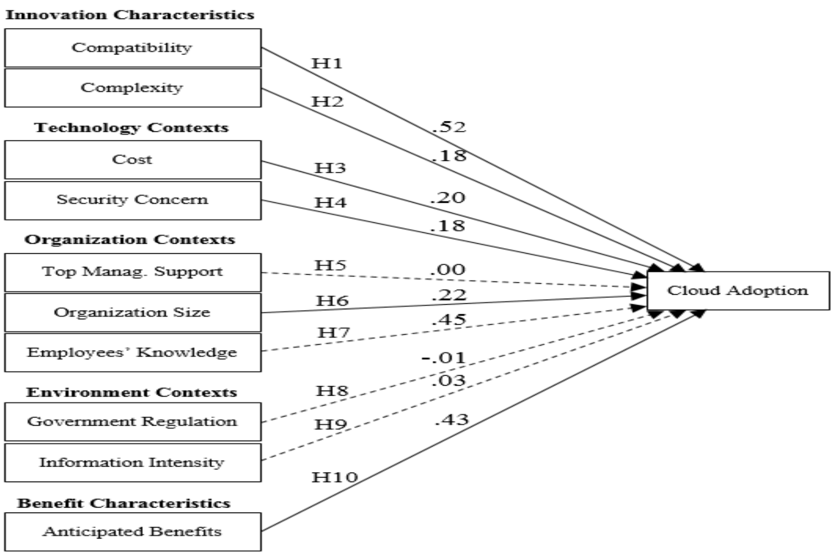
** = value is statistically significant at P < 0.05 level*

*** = value is statistically significant at P < 0.01 level*

The results of the regression tests that presented in Table 6.65 indicated and confirmed that six out of ten constructs in the research structural model have been accepted. These constructs are (compatibility; complexity; cost; security concern; organisation size; anticipated benefit). While the other four constructs in the research structural model have been rejected. These constructs are (top management support; employees' knowledge; government regulation; information intensity).

6.9 Results of Hypotheses Examination

In Chapter 3, a research structural model and a series of hypotheses were developed so as to make sure the provision of suitable answer to the research questione outlined in Chapter 1. In this section, the research structural model and hypotheses will be evaluated by employing the results of the SEM. The hypothesesed path results of the research structural model are reported in this section to test the hypotheses (see Figure 6-32).



Significant at (P < 0.05) and (P < 0.01) standardised path coefficients are appear as sold arrows. Non-significant paths appear as dashed arrows.

Figure 6.32: Model Hypotheses Results

The SEM findings that are demonstrated in Table 6.66 are measured on the basis of: estimated path coefficient (β) value with critical ratio (t-value), and p value. The standard decision rules t-value greater than 1.96, and p value is ≤ .05 and ≤ .01 apply in this research. It tends to determine the importance of the underlying path coefficient between the dependent variable and independent variables (Byrne, 2001; Holmes-Smith, 2001).

Table 6.66: SEM output for hypothesised path relationships in the research structural model

Hypotheses		Paths			Research Structural Model				Results
					Standardised (β)	**S.E.**	**C.R. (t)**	**P**	
H1	Increase the level of CC's compatibility with organisation's norms and technologies has a positive influence on the intention to adopt cloud applications.	Compat	→	Adopt	**.577**	**.227**	**2.540**	**.011***	Supported
H2	The perceived low level of complexity of CC has a positive impact on the intention to adopt cloud applications.	Complex	→	Adopt	**.134**	**.056**	**2.405**	**.016***	Supported
H3	CC as being less costly than other computing paradigms is more likely to adopt.	Cost	→	Adopt	**.269**	**.165**	**2.619**	**.009****	Supported
H4	CC as being secure, the more likely to adopt.	SecC	→	Adopt	**.140**	**.062**	**2.252**	**.024***	Supported
H5	Organisations with high top management support are more likely to intention to adopt CC.	TMS	→	Adopt	.003	.097	.033	.974	Not Supported
H6	Size of organisation will be positively correlated with the intention to adopt CC.	OZ	→	Adopt	**.254**	**.155**	**2.815**	**.005****	Supported
H7	Increase employee's knowledge about CC is positively related to the intention to adopt CC.	EK	→	Adopt	.305	.196	1.554	.120	Not Supported
H8	Creating rules and policy about CC is positively related to the intention to adopt CC.	GR	→	Adopt	-.012	.223	-.056	.956	Not Supported
H9	Organisations with high information intensity are more likely to adopt CC.	II	→	Adopt	.057	.229	.250	.803	Not Supported
H10	The benefits creating from using CC technology is positively related to the intention to adopt CC.	AB	→	Adopt	**.678**	**.252**	**2.692**	**.007****	Supported

**Results supported at significance level: $p \leq .01$, $p \leq .05$*

Hypothesis 1: Compatibility: The results of the regression test confirmed that compatibility demonstrates strongly significant positive impact on the cloud adoption. The standardised regression coefficient (β) was 0.577 with critical ratio (t-value) 2.540, and p value is < 0.05 level .011*. So, increase the level of CC's compatibility with organisation's norms and technologies has a positive influence on the intention to adopt CC. Therefore, this hypothesis was supported.

Hypothesis 2: Complexity: The results of the regression test confirmed that complexity demonstrates a significant positive impact on the CC adoption. The standardised regression coefficient (β) was 0.134 with critical ratio (t-value) 2.405, and p value is < 0.05 level .016*. So, the low level of complexity of CC has a positive impact on the intention to adopt CC. Therefore, this hypothesis was supported.

Hypothesis 3: Cost: The results of the regression test confirmed that cost demonstrates a significant positive impact on the CC adoption. The standardised regression coefficient (β) was 0.269 with critical ratio (t-value) 2.619, and p value is < 0.01 level .009**. So, CC as being less costly than other computing paradigms is more likely to adopt. Therefore, this hypothesis was supported.

Hypothesis 4: Security concern: The results of the regression test indicated and confirmed that security concern demonstrates a significant positive impact on the CC adoption. The standardised regression coefficient (β) was 0.140 with critical ratio (t-value) 2.252, and p value is < 0.05 level .024*. So, if CC is secure, then there is an increased likelihood for adoption. Therefore, this hypothesis was supported.

Hypothesis 5: Top management support: The results of the regression test indicated that top management support demonstrates non significant impact on the CC adoption. The standardised regression coefficient (β) was 0.003 with critical ratio (t-value) .033, and p value .974. Based on these results, organisations with high top management support are not more likely to adopt CC. Therefore, this hypothesis was not supported.

Hypothesis 6: Organisation size: The results of the regression test indicated and confirmed that organisation size proves a significant positive impact on the CC adoption. The standardised regression coefficient (β) was 0.245 with critical ratio (t-value) 2.815, and p value is < 0.01 level .005**. So, the size of organisation is positively correlated with the intention to adopt CC. Therefore, this hypothesis was supported.

Hypothesis 7: Employees' knowledge: The results of the regression test indicated and confirmed that employees' knowledge illustrates positive impact on the CC adoption but it is not significant. The standardised regression coefficient (β) was 0.305 with critical ratio (t-value) 1.554, and p value at .120. Based on these results, increase employee's knowledge about CC is positively related to the intention to adopt CC, but it is not significant. Therefore, this hypothesis was not supported.

Hypothesis 8: Government regulation: The results of the regression test indicated and confirmed that government regulation proves non significant impact on the CC adoption. The standardised regression coefficient (β) was -0.012 with critical ratio (t-value) -0.056, and p value at .956. Based on these results, creating rules and policy about CC is not positively related to the intention to adopt CC. Therefore, this hypothesis was not supported.

Hypothesis 9: Information intensity: The results of the regression test indicated that information intensity shows non significant impact on the CC adoption. The standardised regression coefficient (β) was 0.057 with critical ratio (t-value) 0.250, and p value at .803. Based on these results, organisations with high information intensity are not more likely to adopt CC. Therefore, this hypothesis was not supported.

Hypothesis 10: Anticipated benefit: The results of the regression test indicated and confirmed that anticipated benefit shows a strongly significant positive impact on the CC adoption. The standardised regression coefficient (β) was 0.678 with critical ratio (t-value) 2.692, and p value is < 0.01 level .007**. So, the benefits creating from using CC technology is positively related to the intention to adopt CC. Therefore, this hypothesis was supported.

6.10 Assessment of Relationship Strength

The path coefficient is usually employed to determine the size of an effect. A weak effect is represented by values less than 0.1; a small effect is represented by values more than 0.1; a medium effect is represented by values between 0.2 and 0.5 while a large effect is represented by value more than 0.5 (Cohen, 1988; Field, 2009).

Ten relationships were examined between the constructs of the research structural model. The relationships were in four categories based on their strength.

Relationships that have a large effect:

- The relationship between compatibility and CC adoption.
- The relationship between anticipated benefit and CC adoption.

Relationships that have a medium effect:

- The relationship between cost and CC adoption.
- The relationship between organisation size and CC adoption.
- The relationship between employees' knowledge and CC adoption.

Relationships that have a small effect:

- The relationship between complexity and CC adoption.
- The relationship between security concern and CC adoption.

Relationships that have a weak effect:

- The relationship between top management support and CC adoption.
- The relationship between Government regulation and CC adoption.
- The relationship between information intensity and CC adoption.

6.11 Discussion

This section provides discussion about respondents' demographic analysis; factors to be considered for cloud adoption; anticipated benefit from cloud adoption, challenges and issues that influence cloud adoption**;** and revised research model through SEM analysis.

6.11.1 Respondents' Demographic Analysis

This section discusses the findings of the online survey participants' demographics. The demographic information consisted of three items: their role in the field of IT, their knowledge of CC, and their total years of experience with CC. Most of the participants were in an IT management role (49.6 percent), followed by 28.8 percent who were in systems development/analyst/programmer roles, and the next largest group were 21 percent who were in IT as operations/systems administrator/user support roles. Regarding their knowledge of CC, the results indicated that the highest level of knowledge, which was described as "good knowledge" was made up of a group of 238 persons, representing 49.6 percent of the sample, followed by the next level described as ‘knowledgeable’, followed by the level of “some knowledge” that comprised 106 persons, who made up 22.1 percent of the sample. These percentages suggest that more than half of the respondents had a good level of knowledge of CC. The highest number of participants belongs to a group who had a level of experience of 2-5 years; this group had 250 respondents and represented 52.1 percent of the sample, with the next largest group having 6-10 years of experience and comprising 111 respondents who made up 23.1 percent of respondents. These results indicated that most of the respondents had considerable experience with IT.

6.11.2 Factors to be considered for Cloud Computing Adoption

The research findings related to the factors that need to be considered for the adoption of CC, confirm that internet connectivity seen as strongly important with nearly 85 percent when planning to adopt CC, followed by speed of the Internet with 70 percent. Next, data backup with 65 percent, security with 53 percent, and cost with 50 percent. Integration seen as important with nearly 58 percent, reliability, security, cost all of these factors indicated as important with over 40 percent. Data storage location seen as slightly important with nearly 50 percent, followed by provider dependability with 43 percent, and availability and reliability were closely to 40 percent. Where, data sovereignty seen as neutral with nearly 32 percent, followed by transportability with 30 percent.

In general, there are no empirical studies specifically about the factors required to be considered when planning to adopt CC services in Australian local councils. This limitation has hindered strategy development to improve the adoption of CC in local governments (Department of Innovation Industry Science and Research, 2011). There are only a few studies that describing the importance of individual factors such as internet connectivity (Tweneboah-Koduah, 2012); internet speed (Magele, 2005; Voorsluys et al., 2011); reliability (Voorsluys et al., 2011); availability (Ahuja & Mani, 2012); data storage location (Jaeger et al., 2008); security (Paquette et al., 2010); data sovereignty (Tweneboah-Koduah et al., 2014); cost (Li et al., 2009); integration (Tripathi & Parihar, 2011); data backup (Hemant et al., 2011); employees’ knowledge (Kuan & Chau, 2001; Lippert & Forman, 2005) as factors to be considered when planning to adopt CC. The findings of this part of the research add some empirical weight to support previous findings related to the factors that need to consider when planning to adopt CC. Also, the findings of this part of the research come with new factors that important to consider for cloud adoption. These new factors are: provider dependability; and transportability.

6.11.3 Anticipated Benefit from Cloud Computing Adoption

The research findings found that respondents' belief in the anticipated benefits of the adoption of CC confirmed that the benefit they sought most was a reduction in IT infrastructure; as 75 percent strongly agreed, followed by the factor of reduced level of risk with 70 percent, providing better services, storage capacity, disaster recovery and backup all of these benefits indicated by the participants as 'strongly agree' with 65 percent, and remote access with 53 percent. 'Reduce cost' was seen as most important as agree with 58 percent, followed by flexibility with 57 percent, availability of services 54 percent, and 'time efficiencies' with 41 percent.

This research focuses on the anticipated benefits of CC adoption in ARMGs environment. Since there is limited literature related to ARMGs and CC. Also, there is a lack of studies that provide an in-depth and holistic investigation of all the actual anticipated benefits of adopting CC (Low et al., 2011; Misra & Mondal, 2011). That is, the researcher could not find any studies that listed all benefits of CC and explained why and how they are benefits. The findings derived from this part of the research have shown that CC adoption in government organisations resulted in significant cost reductions, improved service delivery and reduced IT infrastructure. Furthermore, time-effective and convenient services were delivered to the public. From the points of benefits provided by CC, there is a great result for local councils IT staff to take them away the responsibility of the maintenance burden in the councils. Adopting cloud network redundancy eliminates disaster recovery risks and its high costs. There can always be new tools and applications to improve IT features.

6.11.4 Challenges and Issues that Influence Cloud Computing Adoption

The research findings related to the challenges and issues that influence the adoption of CC indicate that the need of an effective network seen as strongly important with nearly 80 percent, followed by loss of control over data with 70 percent, cost with 62 percent, security with 58 percent, backup with 57 percent, and availability of different providers with 55 percent. Integration was seen as being important with about 62 percent, followed by privacy with 50 percent. Trust was seen as slightly important with

50 percent, followed by policy maker with 47 percent, and data storage location with nearly with 39 percent.

Recent developments have ensured the increasing prominence of CC as an online shared computing resource. Based on the above arguments, it can be deduced that even though CC is economical and ensures an increase in performance, productivity and competency; still there are a lot of challenges and issues related to the adoption of CC. When compared to the findings of previous studies, the findings of this research are completely different. This is because most of the previous studies found that concern about security was the most important issue that influenced decision making about CC adoption (Behl, 2011; Ramgovind et al., 2010; Pearson, 2009; Julisch & Hall, 2010; Jensen et al., 2009; Wyld, 2010). However, the findings of this research confirmed that the effectiveness of the network was the most important issue that faced regional municipal governments when they were considering whether or not to adopt CC.

When reviewing the at the literature related to the challenges and issues that influence CC adoption, we found that some of our research findings were similar to the findings from the literature, such as effective network (Liu & Wassell, 2011); security and loss control over data (Gharehchopogh & Hashemi, 2012; Duffany, 2012); data storage location (Jaeger et al., 2008); cost (Saeed et al., 2011; Saini et al., 2011); backup of data (Hemant et al., 2011); privacy (Alshomrani & Qamar, 2013; Yadav & Singh, 2012); integration (Tripathi & Parihar, 2011); trust (Pearson & Benameur, 2010). The other findings of this part of the research can be seen as new findings related to the challenges and issues that influence the adoption of CC. These new issues are: availability of different providers; policy makers; lack of real understanding of the cloud; and business transformation.

6.11.5 Revised Research Model through SEM Analysis

Figure 6.31 showed that the research proposed model of CC adoption, after having conducted SEM analysis on the paths among the research model constructs. Each of these constructs will be revised next.

- **Compatibility**

This research model shows that there is a strong significant and positive relationship between compatibility and the intention to adopt CC. Results that presented in Table 6.66 indicate that compatibility has a significant and positive impact on the intention to adopt CC. This relationship is significant and positive with path coefficient (β) 0.577 with t-value about 2.540, and p value is < 0.05.

According to the literature review, there are many previous studies describing the role of compatibility, and they consider it as an essential determinant of IT innovation adoption (Rogers, 2003; Teo et al., 1997; Premkumar & Roberts, 1999; Premkumar, 2003; Ching & Ellis, 2004; Daylami et al., 2005). Also, other researchers found compatibility as one of the most significant drivers in the post-adoption stages of innovation diffusion (Thong, 1999; Zhu et al., 2006b). Our research findings are consistent with the previous literature. Based on the research findings, the ARMGs should pay more attention to the compatibility to increase the adoption rate of CC.

- **Complexity**

This research model shows that there is a significant and positive relationship between complexity and the intention to adopt CC. Results that presented in Table 6.66 indicate that complexity has a significant and positive impact on the intention to adopt CC. This relationship is significant and positive with path coefficient (β) 0.134 with t-value about 2.405, and p value is < 0.05.

The complexity of an innovation can act as a barrier to the adoption of new technology (Premkumar & King, 1994; Low et al., 2011). Some researchers generalised that complexity has a negative impact related to the adoption of new technology (Rogers, 1983; Thong, 1999). Others showed that there is no relationship between complexity and innovation adoption (Kendall et al., 2001; Seyal & Rahman, 2003). But, in some recent studies, complexity has been found to be a significant factor in the adoption decision (Tiwana & Bush, 2007; Chaudhury & Bharati, 2008; Harindranath et al., 2008). Our research findings showed that the complexity is a significant and has a positive impact to the adoption of CC. As a result of that our finding are consistent with these previous literature that found complexity to be a significant factor in the adoption decision. But, our findings are inconsistent with Rogers (1983) and Thong (1999), because they generalised that complexity has a negative impact related to the adoption of new technology.

- **Cost**

This research model shows that there is a significant and positive relationship between cost and the intention to adopt CC. Results that presented in Table 6.66 indicate that cost has a significant and positive impact on the intention to adopt CC. This relationship is significant and positive with path coefficient (β) 0.269 with t-value about 2.619, and p value is < 0.01.

The chief driving component for organisations to consider cloud-based operational models is the expected financial benefits (LGAQ, 2013). According to the literature there appear to be a dearth of studies related to the cost and the adoption of CC. Most of previous studies describing the role of cost, and they just consider the cost as one of the significant advantages of CC (Cervone, 2010; Saeed et al., 2011; Saini et al., 2011; Sultan, 2010). Our research findings confirmed that there is a significant relationship between the cost and the intention of CC adoption and also has a positive impact to the adoption decision.

- **Security concern**

This research model shows that there is a significant and positive relationship between security concern and the intention to adopt CC. Results that presented in Table 6.66 indicate that security concern has a significant and positive impact on the intention to adopt CC. This relationship is significant and positive with path coefficient (β) 0.140 with t-value about 2.252, and p value is < 0.05.

In the context of CC, security is the degree to which CC is perceived as being more secure than other computing paradigms. As in other fields of computer systems, security is a critical issue in CC (Paquette et al., 2010; Subashini & Kavitha, 2011). Moving to the cloud adds new layers for securing data and expected to influence the organisations' decision to adopt the innovation (Wyld, 2010; Lagesse, 2011; Kaufman, 2009). Our research findings indicated that the security concern is a significant and has a positive impact to the adoption of CC. Based on the research findings, the ARMGs should pay more attention to discuss the security concern with the service providers to increase the adoption rate of CC.

- **Top management support**

This research model shows that there is not a significant relationship between top management support and the intention to adopt CC. Results that presented in Table 6.66 indicate that top management support has non-significant impact on the intention to adopt CC. This relationship is non-significant with path coefficient (β) 0.003 with t-value about .033, and p value is .974.

Based on some previous studies it has been indicated that technology innovation adoption can be influenced by top management support and attitudes towards change (Premkumar & Michael, 1995; Eder & Igbaria, 2001; Daylami et al., 2005). Others pointed that top management support is considered to have an impact on ICT innovation adoption (Daylami et al., 2005; Wilson et al., 2008). But, other researchers confirmed that there is no any impact between the adoption of new technology and top management support (Thong et al., 1993; Seyal et al., 2004).

Our findings showed that the top management support is not a significant and has not a positive impact to the intention to adopt CC. As a result of that, this research's finding is in line with (Thong et al., 1993; Seyal et al., 2004), and in contrast with the findings of (Premkumar & Michael, 1995; Eder & Igbaria, 2001; Daylami et al., 2005; Wilson et al., 2008).

The top management support is not a significant and has not a positive impact to the intention to adopt CC. Because, the lack of real understanding of the cloud is new important issue that emerged upon the adoption of cloud computing. So, the top management who made the decision to adopt cloud computing in a local councils had a limited knowledge. Also, some of the top management did not come from an IT background and did have not any experience or knowledge in relation to cloud computing adoption.

- **Organisation size**

This research model shows that there is a significant and positive relationship between organisation size and the intention to adopt CC. Results that presented in Table 6.66 indicate that organisation size has a significant and positive impact on the intention to adopt CC. This relationship is significant and positive with path coefficient (β) 0.245 with t-value about 2.815, and p value is < 0.01.

Organisational size has long been at the heart of studies looking at IT innovation adoption and is considered to be an important predictor of IT innovation adoption (Jeyaraj et al., 2006; Lee & Xia, 2006). According to Annukka (2008), there are some studies that report a positive correlation between organisation size and the adoption of new technologies (Mahler & Rogers, 1999; Kamal, 2006), other studies report a negative correlation (Utterback, 1974; Goode & Stevens, 2000) and some others report a non-significant correlation (Aiken et al., 1980; Grover & Goslar, 1993). Also, it has been argued that larger organisations have more resources, skills, experience and ability to adopt new technologies than smaller organisations. On the other hand, because of their size, small organisations can be more innovative, they are flexible enough to adapt their actions to the quick changes in their environment (Jambekar & Pelc, 2002). Our research findings confirmed that there is a significant relationship between the organisation size and the intention to adopt CC and also has a positive impact to the adoption decision. Consequently, our findings are consistent with previous literature that found organisation size to be a significant factor in the adoption decision such as (Mahler & Rogers, 1999; Jambekar & Pelc, 2002; Kamal, 2006; Jeyaraj et al., 2006; Lee & Xia, 2006); but were inconsistent with the findings of (Utterback, 1974; Aiken et al., 1980; Grover & Goslar, 1993; Goode & Stevens, 2000).

- **Employees’ knowledge**

This research model shows that there is a positive relationship between employees’ knowledge and the intention to adopt CC, but this relationship is not significant. Results that presented in Table 6.66 indicate that employees’ knowledge has positive impact on the intention to adopt CC but it is not significant. This relationship is a positive with path coefficient (β) 0.305 with t-value about 1.554, and it is not significant because p value is .120.

According to Roger (2003) the employee’s adoption behaviour can be affected by the accumulated experience using new innovations. In the case of CC, familiarity with technologies such as virtualisation, and cluster computing can have a direct influence upon employee perceptions regarding CC services. Several studies have found prior experience to have a high impact in technology adoption decisions (Bandura, 1977; Igbaria et al., 1995; Kuan & Chau, 2001; Lippert & Forman, 2005). Our research findings confirmed that there is positive impact between the employees’ knowledge and the intention to adopt CC and this impact as shown in the research findings is not significant. Consequently, our findings are consistent with previous literature that found employees’ knowledge to have a positive impact in the adoption decision such as (Bandura, 1977; Igbaria et al., 1995; Kuan & Chau, 2001; Lippert & Forman, 2005). Based on the research findings, the ARMGs should pay more attention to increase the skills, knowledge, and experience of their employees to increase the adoption rate of CC.

- **Government regulation**

This research model shows that there is not a significant relationship between government regulation and the intention to adopt CC. Results that presented in Table 6.66 indicate that government regulation has non-significant impact on the intention to adopt CC. This relationship is non-significant with path coefficient (β) -0.012 with t-value about -0.056, and p value is .956.

Government regulation is another critical environmental factor that can influence IT innovation adoption (Kaufman, 2009). Governments could encourage the adoption of CC by creating rules to protect businesses in the use of this system (Best et al., 2008; Kraemer et al., 2006; Jaegar, 2007; Carrico & Smalldon, 2004). Our research findings indicate that there is not a significant relationship or any impact between government regulation and the intention to adopt CC. So, our findings are inconsistent with the findings of (Carrico & Smalldon, 2004; Best et al., 2005; Kraemer et al., 2006).

This research model shows that there is not a significant relationship between government regulation and the intention to adopt CC. Because, this research found out that there is no specific government regulations that used by local councils to adopt cloud computing. Most of the government regulations that used by local councils focus on risk factors such as security, privacy, and cost.

- **Information intensity**

This research model shows that there is not a significant relationship between information intensity and the intention to adopt CC. Results that presented in Table 6.66 indicate that information intensity has non-significant impact on the intention to adopt CC. This relationship is non-significant with path coefficient (β) 0.057 with t-value about 0.250, and p value is .803.

Many previous studies have reported that organisations that use more advanced ICT technologies have more ability to access internal, external, and previously encountered information (Chau & Tam, 1997; Chong et al., 2009; Thong, 1999; Yap, 1990). The greater the information intensity, the greater the potential for strategic uses of IS in organisations (Porter & Miller, 1985). Our research findings indicate that there is not a significant relationship or any impact between information intensity and the intention to adopt CC. So, our findings are inconsistent with the findings of (Chau & Tam, 1997; Chong et al., 2009; Thong, 1999; Yap, 1990).

- **Anticipated benefit**

This research model shows that there is a strong significant and positive relationship between anticipated benefit and the intention to adopt CC. Results that presented in Table 6.66 indicate that anticipated benefit has a significant and positive impact on the intention to adopt CC. This relationship is significant and positive with path coefficient (β) 0.678 with t-value about 2.692, and p value is < 0.01.

Many empirical studies found that perceived benefits have played an important role in the adoption of any new technologies (Beatty et al., 2001; Kuan & Chau, 2001; Gibbs & Kraemer, 2004; Daniel & Grimshaw, 2002). Our research findings confirmed that anticipated benefit is a strongly significant and a positive impact to the adoption of CC. As a result of that our finding are consistent with previous literature.

6.12 Summary

This chapter represents the findings of the research structural model with path coefficient relationships which was evaluated using SEM. All hypotheses were examined and reported, six out of ten hypotheses in the proposed model were found to be significant and have a positive impact on the intention to adopt CC. Only one hypothesis in the proposed model was found to be a positive impact on the intention to adopt CC but it is not important. The other three hypotheses in the proposed model were found non-significant and have negative impact on the intention to adopt CC. A revision of research objectives were done in the subsequent chapter. Following this, theoretical contributions of the research are represented. This is followed by representation of practical contributions as well as a discussion on the possible limitations and future research.

7 CHAPTER SEVEN:-

CONCLUSION, LIMITATION, AND FUTURE RESEARCH

7.1 Overall

The objective of this research was to investigate and develop a CC adoption model for ARMGs. The research utilised a combination of TOE framework and DOI theory for the theoretical validation of the proposed model. The model was then used to investigate the significance of ten important constructs on CC adoption in ARMGs. The intention of the research was to analyse council intentions or decision-making on the use or adoption of new technologies by constructs including innovation characteristics, technological, organisational, and environmental contexts, and benefit characteristics. The results of this investigation offer guidelines to local councils on CC adoption.

7.2 Summarising of the Research Objectives

This section provides a summary to each objective in this research. Each of the objectives will now be addressed in turn.

Objective 1: ***To investigate the factors that need to be considered when planning to adopt CC in ARMGs.***

This section of the research generally focused on the factors to be considered for CC adoption. The key factors to be considered for CC adoption in Australian regional councils were recognised as (1) Internet connectivity which include (internet speed, availability, and reliability), (2) data storage location (which include security, and data sovereignty), (3) cost, (4) integration, (5) data backup, (6) provider dependability, (7) employees' knowledge, and (8) transportability. The outcomes of this section of the research aim to provide some practical weight in holding up findings of previous researches. Respondents in the research pointed out the requirement for high quality internet connectivity for improved deployment within their organisations, while some others reflected the need for improved integration. Some respondents pointed out problems and the need for effective training and education on guidelines and security in various data centre hosting authorities. Some of the participants reported the need for providing strong justification on the cost effectiveness of CC adoption. The results of this section of the research are essential in reflecting an improved understanding on how various factors impact the adoption which may support in improved and informed managerial level decision making processes relevant to CC service systems.

Objective2: ***To explore the challenges and issues that influence the adoption of CC in ARMGs.***

Recent developments have ensured the increasing fame of cloud computing as it is an online shared computing resource. Based on the above arguments, it can be deduced that even though it is economical and ensures an increase in performance, productivity and competency, there are a lot of challenges and issues relating to the adoption of cloud computing. In this research, the analysis has proved some of the challenges and issues such as security, privacy, trust, management of data, cost, and infrastructure were part of the literature review, and there were concerns regarding effective network, data storage location, availability of different providers, policy makers, lack of real understanding of the cloud, and business transformation with the incorporation of cloud computing, which were raised by the IT managers. The findings of this research expected to assist managers to evaluate possible adoption and increase their awareness about challenges and issues that influence the cloud adoption when planning to adopt it.

Objective 3: ***To study the anticipated benefits of the adoption of CC in ARMGs.***

This section of the research focuses on the anticipated benefits of adoption of CC in ARMG environment. The results obtained through this research indicates that the adoption of CC in government organisations can lead to considerable cost reductions, reduced infrastructure requirements for IT and improved the quality of service delivery where services were provided to the customers in a convenient and time saving manner. It is capable of reducing the challenges related to maintenance faced by the local councils. The network redundancy of cloud lowers the risks related to disaster recovery and associated expenses. For improving IT features new tools and applications can be introduced regularly. These results confirm the findings from the literature. Due to the fact that the core of Australian local council programs are based on sharing of information, processing and providing services, CC appears to be an successful way of systems integration.

Objective 4: ***To develop a research model that can be used to examine CC adoption at the organisational level in ARMGs.***

A combination of TOE framework and DOI theory were proposed for this research to study the adoption of CC in ARMGs. The TOE framework characterises main three constructs of the process of innovation (technological, organisational, and environmental context), and the research model shows that the technological context adoption process is governed by two factors. There are three constructs that are important to consider when it comes to the adoption of the organisational context: top management support, organisation size, and employees' knowledge. One of the major factors take in to account is the organisational domain. If any changes that do not consider this aspect may generally have negative and unforeseen significances (Cameron & Quinn, 2005). The environmental context for the adoption is governed by two factors (government regulation, and information intensity). Previous studies suggested that the environmental context is vital in the estimation of the adoption behaviour of the new innovations (Damanpour & Gopalakrishnan, 1998).

DOI theory characterises one construct of the innovation process, which way the stable framework impacts the adoption and employment of novelties (Baker, 2011). It has been identified based on the research model that the process of adopting the innovation characteristics is dependent on two factors (compatibility, and complexity). Theories such as DOI have been heavily used in research works seeking at how innovations are adopted.

Benefit characteristics is another important construct that added to the research model, and this construct influenced by one factor (anticipated benefits). Benefit characteristics is need to be consider, in particular when the adopting of the technology in ARMGs need to recognise which part of the business will be benefited from the new technologies. It is important for ARMGs to have a better understanding of the process of adoption and their benefits and inhibitors.

The adoption of cloud system and incorporated computing models can have significant impacts. In particular the way a given business maintained, developed and scaled up computing services can be changed. The research proposed model consists of five different categories that are believed to influence the adoption of CC technology in

ARMGs; (1) innovations characteristics, (2) technological contexts, (3) organisational contexts, (4) environmental contexts, and (5) benefit characteristics.

Objective 5: ***To empirically validate the research model qualitatively and ensure its validity.***

As discussed in chapter five, a comprehensive study based on the available literature was carried out on the conceptual model developed in previous research works. The research finding based on the TOE framework and DIO theory, suggests the interest of organisations on the adopting of CC-based technologies depends on many different factors. Based on the early research model two constructs implemented from DOI theory; and seven constructs implemented from TOE framework, verification was found for all of the nine constructs, which warrant verification that they are vital factors.

The main constructs recognised as the key factors in the adopting of CC in ARMGs are; compatibility, complexity, cost, security concern, top management support, organisation size, employees' knowledge, government regulation, information intensity, and anticipated benefit.

Objective 6: ***To study the factors which encourage or discourage the adoption of CC in ARMGs by testing the conceptual research model quantitatively with an appropriate sample*.**

Based on the statistical analysis of the data obtained by this research, there were six hypotheses out of ten that show positive and significant impact on the intention to adopt CC in ARMGs. It was found based on the TOE framework and the DOI theory that intention to adopt for CC is driven by more than one context mentioned above. These results support to use the combination of both TOE framework and DOI theory to carry out the investigation on the adopting behaviour of government's councils on CC. Compatibility, complexity, cost, security concern, organisation size, and anticipated benefits are the main six constructs that were found as a positive and significant factor in this context. Employees' knowledge was identified as a factor with positive impact but it is not a significant factor compared to above six factors. The rest of the factors (top management support, government regulation, and information intensity) were not found to be significant in the adoption of CC technology.

7.3 Theoretical Contributions

The research aims to provide a contribution to the area of IT/IS, by investigating the adoption of CC in ARMGs. The knowledge and the findings on the government's adoption of latest technologies such as CC support to investigate the ways of organisations move toward the latest technologies developed in this area. This research delivered findings on the factors that need to be considered thoroughly when planning to adopt these technologies. The research findings highlight challenges and issues that associated with the employment of CC. The advantages of using such technologies are detailed in this thesis work.

One of the major goals of this research was to deliver a validated CC adoption model, which was developed based on the combinations of TOE framework (Tornatzky & Fleischer, 1990) and DOI theory (Rogers, 1995), that can be used to identify the significance of different constructs detailed above on the adopting behaviour of CC in ARMGs.

The adoption model developed in this research was built based on the previous findings on the IT/IS adoption. Previous studies on this area of the research focused on the influence of the organisational factors on the use of IS innovation in the organisations (Rai & Howard, 1994; Grover & Teng, 1992) and the significance of technological factors (Moore & Benbasat, 1991). The model developed in this research was based on consideration of various constructs (innovation, technology, organisation, and environment) and their effects on the adopting behaviour and this model adds new insights and knowledge to this area of the research. Based on the available literature on CC adoption models, the combination of the TOE framework (Tornatzky & Fleischer, 1990) and DOI theory (Rogers, 1995) has not been utilised before to investigate the adoption of CC. Previous research has not considered the influence of technological, organisational, and environmental context, innovation characteristics, and benefits characteristics on CC adoption. The research model can be used beyond ARMGs by employing appropriate model modifications.

The outcomes of this research contribute to the rising body of literature on adoption of CC by exploring the effects of five key features on the subsequent different dimensions. The main five constructs considered are (1) Innovation characteristics which including (compatibility, and complexity). (2) Technology context including (cost, and security concern). (3) Organisational context including (top management support, organisation size, and employees' knowledge). (4) Environmental context including (government regulation, and information intensity). (5) Benefits characteristics including (anticipated benefit). Most of the key constructs considered in the literature are incorporated in this model development to investigate the adoption behaviour of the organisation into technologies.

A preliminary qualitative research was carried out to validate the conceptual adoption model empirically and to identify the applicability of the model. It is important to consider that the model developed the qualitative research study, at the preliminary stages, need to be identified as an exploratory framework and not as a perspective context.

The adoption model has been developed based on the TOE framework proposed by Tornatzky & Fleischer (1990), and the DOI theory suggested by Rogers (1995). This research model is improved by combining CC certain constructs that characterise sole characteristics of CC like anticipated benefit. Previous research studies have not considered the effect of this factor in the case of adoption of other IS technologies by organisations. In the above-mentioned preliminary qualitative study, it was explored that this factor of anticipated benefits is critical when employing CC to ARMGs. This finding shows how significant the contribution of this research by adding these constructs into this particular research area.

7.4 Practical Contributions

The deliverables of this research aim to contribute not only to the future IS research projects, but also for the improvements of the public services particularly the regional governments. The findings offer support for regional governments to use CC more effectively and efficiently by considering the influence of different factors. The detail discussion is carried out below about the implication of this research for many different groups of users: service providers and technology consultants, managers, and governments.

7.4.1 Implications for Technology Consultants and Service Providers

Regional councils can be considered to be organisations, which represent a vital segment of the market and the country's economy by providing various important services to the local citizen and business. The service provider plays a significant role in implementation and that it is quite clear when the firm and public intermediaries are alert of each other's individual input and a working connection is recognised (Brown & Lockett, 2004).

Organisations that are unsuccessful in adopting technologies may become influential undesirable opinion leaders (Leonard-Barton, 1988). The providers of these services should focus in investigating appropriate role models, study the different problems faced by the organisations, should be aware of the organisational context and take a more positive role to encourage successful diffusion in these organisations. To design and use strategies for the extensive adoption of CC, technology consultants should have a much better understanding about the important factors that affecting the organisation's adoption of CC and related technologies.

The service providers of CC technologies should have a better interaction with the regional governments, who are experiencing these novelties, in an attempt to deliver a healthy environment for the adoption of CC, and to reduce uncertainties surrounding the adoption of CC in these regional governments.

The process of adopting these technologies sometimes take time due to the fact that decision makers of the regional governments are not aware of the potential benefits that these technologies brings to the business. To have a better understanding and awareness of the anticipated benefits of these adoptions play a vital role in decision-making processes.

It has been explored as a part of this research that IT managers of these regional governments related their late response to the adoption of CC to the lack of better understanding of these technologies and knowledge level of employees on this kind of services. Service providers should develop strategies to promote the anticipated benefits of CC.

Technology consultants and service providers should take necessary actions to mitigate the feelings of uncertainties associated with adoption of CC. The location of the data storage is one of the uncertainties around CC. Factors such as internet connectivity, cost, security, trust, integration, backup, provider dependability, employee knowledge, and transportability are significant concerns when planning to adopt CC in a business. The service provider should be capable of delivering secure and reliable environments in the most accessible, economical, and convincing way. This leads to a supportive environment for the business. Service providers should provide the technical support 24/7 to minimise the concerns of customers on data stored remotely away from their locations.

Some of the ARMGs had not felt that they were adequate enough for CC adoption due to many reasons. One possible explanation for this is that service providers identify different factors including the variability, dynamism and face pace of change in the overall operating environment of the IT industry, and say that they are playing a vital role in order to be an active facilitator for these services. At the same time, they don’t want their valuable investments in hardware and software to be affected adversely. This can cause stakeholders to have a negative impression of service providers, who themselves have no clear aims or stance about CC technologies. It can be suggested that further research needs be carried out in this area before conclusions can be drawn about the role of service providers in the adoption of CC, particularly as the user may be affected by the views of the service provider in the extent to which the CC provider is confident about the advantages that the technology will create in their business.

Using the research proposed model in this research by the service providers can assist the following:

- Improve the awareness of the reasons behind the some regional municipal government’s lack of interest on the adoption of CC technology.
- The providers of CC technologies should have a better interaction with the regional governments, who are experiencing these novelties, in an attempt to deliver a healthy environment for the adoption of CC, and to get rid of any uncertainties surrounding the adoption of CC in these regional governments.
- To improve clients’ confidence on could computing service providers should demonstrate their vision and aim of delivering cloud-computing technologies versus in-house services.

7.4.2 Implications for Managers

One of the major challenges decision makers face in business is uncertain and rapidly growing business environment. The major problems, which impact selections, change with time; effects are not yet known when adoptions are made, and often there is a lengthy period between the choices itself and when its consequences become well defined. Managers can use many different related studies to develop their process of decision making in this environment. CC adoption model proposed in this research supports managers to identify the potential adoption and develop their knowledge about the important factors that influences the outcome of such adoptions.

As demonstrated by the empirical analysis, the anticipated benefits play an important role in the adoption of CC in ARMGs. These results imply that managers and decision makers should investigate and evaluate the advantages of adopting such technologies and also they better improve their knowledge and awareness about these services. These developments will support to decrease the level of uncertainties associated with CC adoption. The potential benefits and its instrument explained and discussed can be effectively used by local council managers to deeply evaluate and organise their adoption and implementation of such technologies. This will lead them to understand how CC can enhance the efficiency of their work by increasing the productivity and making them have a great control of their daily work.

The outcomes of this research aim to deliver a set of verified and reliable measures for investigation the support of CC. It can be seen that to choose the ideal CSP, managers must play a vital role with great attention. As explained earlier compatibility, complexity, cost, and security concern can be considered as the most important factors when adopting these technologies to business. The main task of selected service provider to deliver high level technical and organisational support to reduce the uncertainties associated with technical and organisational matters. The managers must consider the size of their organisations when selecting the most suitable CC system for their firm. Findings of the research also suggest that the type of CC adopted is significantly affected by the computing support delivered by the service provider. This indicates that organisations should try to obtain the all possible supports from the service provider in all critical stages; from early stage to full employment of the technology and the final stage of application.

CC adoption model developed in this research based on an integrative approach can be supportive of ARMGs, who have an intention to use these technologies and want to conduct an in-depth analysis of the potential CC resources and associated capabilities. The research tool can be further modified to access the situation of local councils. The result of such assessment can be used to estimate their strengths or drawbacks and the mode in which the adopted abilities can improve or decrease these in firming their competitive place. The experience that managers develop by interacting with this adoption model will enable them to use it for other different technologies. They can enhance their disunion making abilities in the adoption of suitable technologies to their specific organisational environment.

In comparison to other models, TOE framework and the DOI theory combination contains a multitude of factors technology, organisation, environmental context, and innovation characteristics which provides higher flexibility and benefits than the other models. TOE framework (Tornatzky & Fleischer, 1990) and DOI theory (Rogers, 1995) can provide a better understanding of the adoption phenomenon of IT/IS through an easy to understand the methodology, which is supported by a solid theoretical basis and a reliable empirical support. The combination of TOE framework and the DOI theory shows that it can enhance the decision taking the skill of managers of ARMGs.

7.4.3 Implications for Government

The growth and development of CC may lead to evaluation of government policies and incentives encouraging the technology adoption in ARMGs. Through facilitating considerate of the aspects that affect the adoption and implementation of ICT technologies such as CC, this research model can support harnessing the benefits of the ICT execution efforts of the Australian government. The research outcomes can underpin a comprehensive understanding of the factors that need to be considered when planning to adopt CC, anticipated benefits, and challenges and issues of the implementation of CC in the local government councils ultimately leading to support the ICT implementation process by the Australian government. It can be assumed that CC has a potential to reduce the cost of IT operations in regional governments.

Considering the above factors, this specific research provides information for a multitude of entities including the government, managers, technology consultants, organisations as well as service providers. The research can be considered as applicable to the swift development of CC technologies of the modern times. Ultimately, the above mentioned was aimed at providing strategies in the establishment and improving the development and use of CC within ARMGs.

7.5 Limitations and Future Research

This research is intended at enhancing our knowledge on the implementation of the ICT innovations within ARMGs. Considering the limitations of the research it is assumed that there are numerous additional research and study sectors. Although, this research represents only a very small portion of a vast knowledge area of the adoption of IT innovation, it can be regarded as an important resource for improving the knowledge sector of IT implementation in regional governments, specifically in the aspect of CC. There is a need of in-depth research into certain areas of implementing CC in ARMGs. Based on this research, future research can be built upon by quantitatively and qualitatively investigating the different segments and industries as well as in various countries.

This research was mainly limited to the regional government sector of Queensland. There is a requirement for further empirical investigations in different areas as well as countries. Only two forms of data collection were utilised for achieving the research objectives due to the limited time of the research. Based on that, future research on CC can be conducted in quantitative and qualitative methods which can focus on different industries which can introduce a more comprehensive model and allocate data comparison.

The technique of in-depth interviews (exploratory stage) was used as a data collection method for investigating on the ARMGs. As this method is used for the analysis business related decisions, it is possible to use other approaches such as focus groups for discussing and evaluating issues experienced in IS innovations in current use which will allocate further understanding on the factors of adoption of new technologies. This research was limited to a number of staff members who are working at the ARMGs. Increasing the number of participants from a multitude of sectors may provide a better representation of trends in the respective sectors as well as facilitate more reliable comparisons.

Other research studies can be focused on the factors which can potentially impact CC such as governments' role, cultural implications, and organisational view. Further research is required for investigating the cultural implication of CC as well as to understand the differences in the technology usage among different countries, the impacts on the organisational culture and cultural beliefs on technology. The model used in this research can be applicable for further investigations on the implementation of IS innovation. In-depth investigations should be carried out for understanding how the adoption of CC and IS innovation affects regional governments, start-ups as well as other large organisations.

7.6 Concluding Remarks

This research builds up a conceptual research model for providing answers to the primary research question and objectives. The proposed model was assessed and modifications were made based on SEM analysis for better resigning of modification indices which aimed at developing a better fitting model. It was revealed that for utilisation of CC, there is a positive impact based on the factors which include: compatibility, complexity, cost, security concern, organisation size, as well as anticipated benefits. In comparison, top management support, employees' knowledge, government regulation, and information intensity were revealed to be non-important factors.

This research aimed to identify the factors that influence the utilisation of CC in ARMGs. For the purpose of getting a complete understanding of the utilisation of CC, this specific research used a combination of TOE framework and DOI theory factors which were based on the literature related to IS. The results obtained from this research can be used as a foundation for future research on the area of CC as well as providing guidelines for design implementation of projects related to CC.

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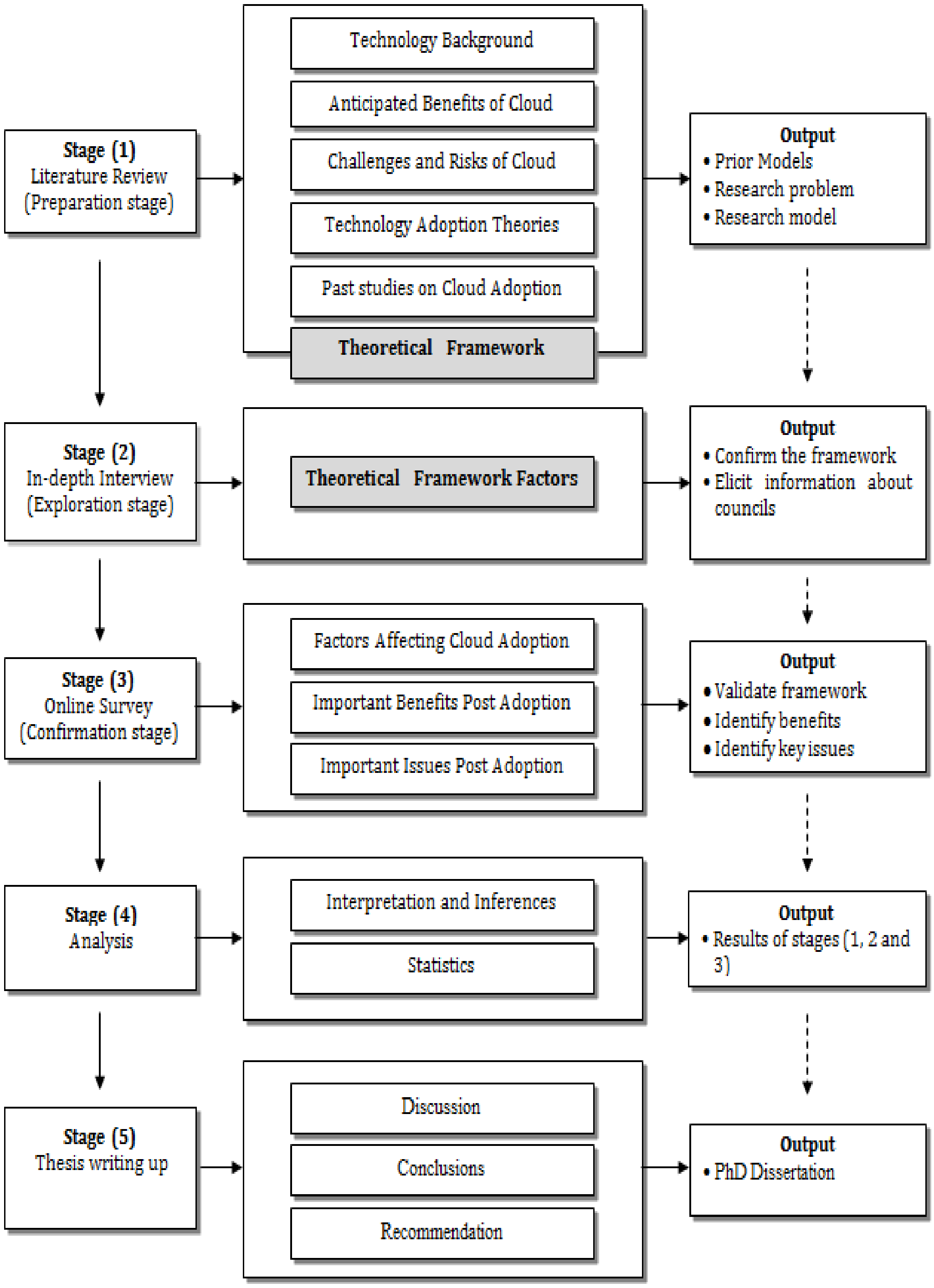
9 APPENDICES

9.1 Appendix A1: Research Design Flow Chart.



Research design
Source: Developed for this research

9.2 Appendix B1: Queensland Local Council Classification.

No	Council	Segment	Category	Classification
1	Aurukun Shire Council	Indigenous	URS	Urban Regional Small
2	Balonne Shire Council	Rural/Remote	RAM	Rural Agricultural Medium
3	Banana Shire Council	Resource	RAV	Rural Agricultural V. L.
4	Barcaldine Regional Council	Resource	RTM	Rural Remote Medium
5	Barcoo Shire Council	Rural/Remote	RTS	Rural Remote Small
6	Blackall-Tambo Regional Council	Rural/Remote	RTM	Rural Remote Medium
7	Boulia Shire Council	Rural/Remote	RTS	Rural Remote Small
8	Brisbane City Council	South East Queensland	UCC	Urban Capital City
9	Bulloo Shire Council	Rural/Remote	RTS	Rural Remote Small
10	Bundaberg Regional Council	Coastal	URM	Urban Regional Medium
11	Burdekin Shire Council	Coastal	RAV	Rural Agricultural V. L.
12	Burke Shire Council	Resource	RTS	Rural Remote Small
13	Cairns Regional Council	Coastal	URV	Urban Regional Very Large
14	Carpentaria Shire Council	Resource	RTM	Rural Remote Medium
15	Cassowary Coast Regional Council	Coastal	RAL	Rural Agricultural Large
16	Central Highlands Regional Council	Resource	RAL	Rural Agricultural Large
17	Charters Towers Regional Council	Rural/Remote	URS	Urban Regional Small
18	Cherbourg Aboriginal Shire Council	Indigenous	URS	Urban Regional Small
19	Cloncurry Shire Council	Resource	RTL	Rural Remote Large
20	Cook Shire Council	Coastal	RTL	Rural Remote Large
21	Croydon Shire Council	Rural/Remote	RTX	Rural Remote Extra Small
22	Diamantina Shire Council	Rural/Remote	RTX	Rural Remote Extra Small
23	Doomadgee Aboriginal Shire C.	Indigenous	URS	Urban Regional Small
24	Douglas Shire Council	Coastal	RSG	Rural Significant Growth
25	Etheridge Shire Council	Rural/Remote	RTM	Rural Remote Medium
26	Flinders Shire Council	Rural/Remote	RTM	Rural Remote Medium
27	Fraser Coast Regional Council	Coastal	URL	Urban Regional Large
28	Gladstone Regional Council	Coastal	URS	Urban Regional Small
29	Gold Coast City Council	South East Queensland	URV	Urban Regional Very Large
30	Goondiwindi Regional Council	Rural/Remote	URS	Urban Regional Small
31	Gympie Regional Council	Coastal	URM	Urban Regional Medium
32	Hinchinbrook Shire Council	Coastal	RAV	Rural Agricultural V. L.
33	Hope Vale Aboriginal Shire Council	Indigenous	URS	Urban Regional Small
34	Ipswich City Council	South East Queensland	UFV	Urban Fringe Very Large
35	Isaac Regional Council	Resource	URS	Urban Regional Small

36	Kowanyama Aboriginal Shire C.	Indigenous	**URS**	Urban Regional Small
37	Livingstone Shire Council	Coastal	**UFS**	Urban Fringe Small
38	Lockhart River Aboriginal Shire C.	Indigenous	**URS**	Urban Regional Small
39	Lockyer Valley Regional Council	South East Queensland	**URM**	Urban Regional Medium
40	Logan City Council	South East Queensland	**UDV**	Urban Development V. L.
41	Longreach Regional Council	Rural/Remote	**RTL**	Rural Remote Large
42	Mackay Regional Council	Coastal	**URL**	Urban Regional Large
43	Mapoon Aboriginal Shire Council	Indigenous	**URS**	Urban Regional Small
44	Maranoa Regional Council	Resource	**RTL**	Rural Remote Large
45	Mareeba Shire Council	Rural/Remote	**RAV**	Rural Agricultural V. L.
46	McKinlay Shire Council	Rural/Remote	**RTM**	Rural Remote Medium
47	Moreton Bay Regional Council	South East Queensland	**UDV**	Urban Development V. L.
48	Mornington Shire Council	Indigenous	**URS**	Urban Regional Small
49	Mount Isa City Council	Resource	**URS**	Urban Regional Small
50	Murweh Shire Council	Rural/Remote	**RTL**	Rural Remote Large
51	Napranum Aboriginal Shire Council	Indigenous	**URS**	Urban Regional Small
52	Noosa Shire Council	Coastal	**UFM**	Urban Fringe Medium
53	North Burnett Regional Council	Rural/Remote	**RTL**	Rural Remote Large
54	Northern Peninsula Area Regional C.	Indigenous	**RTM**	Rural Remote Medium
55	Palm Island Aboriginal Shire C.	Indigenous	**URS**	Urban Regional Small
56	Paroo Shire Council	Rural/Remote	**RTM**	Rural Remote Medium
57	Pormpuraaw Aboriginal Shire C.	Indigenous	**URS**	Urban Regional Small
58	Quilpie Shire Council	Rural/Remote	**RTM**	Rural Remote Medium
59	Redland City Council	South East Queensland	**UFL**	Urban Fringe Large
60	Richmond Shire Council	Rural/Remote	**RTM**	Rural Remote Medium
61	Rockhampton Regional Council	Coastal	**URM**	Urban Regional Medium
62	Scenic Rim Regional Council	South East Queensland	**UDM**	Urban Development Medium
63	Somerset Regional Council	South East Queensland	**RTL**	Rural Remote Large
64	South Burnett Regional Council	Rural/Remote	**URM**	Urban Regional Medium
65	Southern Downs Regional Council	Rural/Remote	**UDS**	Urban Development Small
66	Sunshine Coast Regional Council	South East Queensland	**UDV**	Urban Development V. L.
67	Tablelands Regional Council	Rural/Remote	**URM**	Urban Regional Medium
68	Toowoomba Regional Council	South East Queensland	**URL**	Urban Regional Large
69	Torres Shire Council	Indigenous	**URS**	Urban Regional Small
70	Torres Strait Island Regional Council	Indigenous	**RAL**	Rural Agricultural Large
71	Townsville City Council	Coastal	**URL**	Urban Regional Large

72	Western Downs Regional Council	Resource	**URS**	Urban Regional Small
73	Whitsunday Regional Council	Coastal	**RSG**	Rural Significant Growth
74	Winton Shire Council	Rural/Remote	**RTM**	Rural Remote Medium
75	Woorabinda Aboriginal Shire C.	Indigenous	**URS**	Urban Regional Small
76	Wujal Wujal Aboriginal Shire C.	Indigenous	**URS**	Urban Regional Small
77	Yarrabah Aboriginal Shire Council	Indigenous	**URS**	Urban Regional Small

Rural/Remote: **23** councils
Resource: **10** councils
Indigenous: **17** councils
Coastal: **16** councils
South East Queensland: **11** councils

9.3 Appendix C1: Interview Participant Information Sheet.

AUSTRALIA

University of Southern Queensland

The University of Southern Queensland
Interview Participant Information Sheet

The USQ HREC Approval Number: H14REA079

Invitation to participate in research:

The Perceived Benefits of Cloud Computing for Regional Municipal Government and Barriers to Adoption

I invite you to take part in this research study.

- **Procedures**

This Participant Information Sheet provides information for participants to be fully aware of their involvement in this research study. You need to be informed of what is expected from participation and can freely decide if you consent to participate.

The research study is to be conducted by Omar Ali as part of Doctor of Philosophy Degree supervised by Professor Jeffrey Soar in the School of Management and Enterprise, Faculty of Business, Education, Law and Arts, University of Southern Queensland.

- **Aims**

The aims of this research study are to explore the value creation from cloud computing in Australian regional and municipal government, with a specific focus on Queensland local governments. The study seeks to address and identify the key factors that are perceived to influence the adoption of cloud computing, including challenges, barriers, risks and the current e-government technologies employed. This research study is expected to assist in making investment decisions on cloud computing.

There are no major risks in taking part in this research study. However, the interview will explore your experiences, information, knowledge and level of proficiency in cloud computing in Queensland local governments and provincial organisations. Also, the interview will be concentrated on the technologies, environment and organisational processes and procedures used internally to manage the new technology such as cloud computing.

Participation involves completion of the interview which is about cloud computing adoption, processes, situations or projects that you may have been involved in. Potential participants have been selected from the top management of the Australian regional and municipal government. The interview will be Telephonic interview. It will be recorded on audio tape and then transcribed onto a computer. The audio tapes will be stored in a locked secure place at all times and the computer data will be protected from intrusion also. The audio tapes will be destroyed at the end of the study. The total time commitment is approximately 25-30 minutes.

- **Voluntary Participation**

Participation in this research study is voluntary, any participant is free to participate or free to withdraw from the research at any time, and to request the deletion of the data you have submitted. Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your treatment and relationship with the University of Southern Queensland or where you are employed.

Throughout the research as much feedback as possible will be given to any participant ask about the result of the survey or the outcome of the research, and this process will be conducted by the email.

Please notify the researcher if you decide to withdraw from this research study.

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Phone No. 7 4631 5387
Email: Omar.Ali@usq.edu.au

Should you have any queries regarding the progress or conduct of this research study, you can contact the principal supervisor:

Supervisor: Professor Jeffrey Soar
School of Management and Enterprise
Faculty of Business, Education, Law, and Arts
University of Southern Queensland,
West Street, Toowoomba, Qld, 4350, Australia
Phone No. 7 4631 1255
Email: Jeffrey.Soar@usq.edu.au

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba, Qld, 4350
Phone: +61 7 4631 2690
Email: ethics@usq.edu.au

9.4 Appendix C2: Interview Consent Form.

University of Southern Queensland

The University of Southern Queensland
Interview Consent Form

The USQ HREC Approval Number: H14REA079

TO: Participants,

The Perceived Benefits of Cloud Computing for Regional Municipal Government and Barriers to Adoption

Researcher: Omar Ali
Phone No. 7 4631 5387
Email: Omar.Ali@usq.edu.au

Supervisor: Professor Jeffrey Soar
Phone No. 7 4631 1255
Email: Jeffrey.Soar@usq.edu.au

I have been given information about "*The Perceived Benefits of Cloud Computing for Regional Municipal Government and Barriers to Adoption*" and discussed the research study with Omar Ali who is conducting this research study as part of Doctor of Philosophy Degree supervised by Professor Jeffrey Soar in the School of Management and Enterprise, Faculty of Business, Education, Law and Arts, University of Southern Queensland. I understand the purpose of the research study and my involvement in it.

I understand that there are no potential risks or burdens associated with this research study, and have had an opportunity to ask Omar Ali any questions I may have about the research and my participation.

I understand that my participation in this research study is voluntary and I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect either my treatment or my relationship with the organisation at which this study is conducted and with I am employed.

By signing below I am indicating my consent to participate in the research. I understand that the data collected from my participation will be used primarily for Doctor of Philosophy thesis, and will also be used in summary form for journal or conference publication, and I consent for it to be used in that manner.

Name of participant: ....

Signed: .... **Date:** ....

9.5 Appendix C3: Interview Questions

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The University of Southern Queensland

Interview Questions

Dear Participants,

This research study aims at exploring value creation from cloud computing in regional government agencies by examining the extent of adoption of cloud computing services in Australian regional and municipal government, to identify factors that are likely to influence adoption of cloud computing including challenges, barriers, risks and the current e-government technologies employed.

You are invited to participate in a research study which is expected to assist in making investment decisions on cloud computing in regional and municipal government. The total time commitment is approximately 25-30 minutes.

All information will remain confidential and only aggregate data will be published. In other words, no individual information will be released to any third party.

Thank you for taking your valuable time to complete the interview. Your views are critical to the success of this study.

Yours sincerely,

Omar Ali
Phd Student
School of Management and Enterprise
Faculty of Business, Education, Law, and Arts
University of Southern Queensland
West St. Toowooba, QLD, 4350, Australia
Tel: +61 7 4631 5387
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Professor Jeffrey Soar
Chair in Human-Centred Technology
School of Management and Enterprise
Faculty of Business, Education, Law, and Arts
University of Southern Queensland
West St. Toowooba, QLD, 4350, Australia
Tel: +61 7 4631 1255
Email: Jeffrey.Soar@usq.edu.au

1. Please describe your role in the field of IT/IS?
   ----

2. What is your background, experience and knowledge in relation to cloud computing?
   ----

3. How long have you been involved with cloud computing projects and in what capacity?
   ----

4. What are the factors that need to be considered when focusing on the adoption of cloud computing?
   ----

5. What is the current level of policy for adoption of cloud computing in the Australian regional and municipal government?
   ----

6. What do you think are the significant anticipated benefits of cloud computing in rural and regional government?
   ----

7. What do you think are the top challenges, and issues that influence the adoption of cloud computing in rural and regional government?
   ----

8. What is the impact of the innovations characteristics such as (compatibility, and complexity) on the intention to adopt cloud computing? How? (Please explain).
   ----

9. What is the impact of the technological factors such as (cost, and security concern) on the intention to adopt cloud computing? How? (Please explain).
   ----

10. What is the impact of the organisational factors such as (top management support, organization size, and employees’ knowledge) on the intention to adopt cloud computing? How? (Please explain).
    ----

11. What is the impact of the environmental factors such as (government regulation and information intensity) on the intention to adopt cloud computing? How? (Please explain).
    ----

12. Please provide any additional comments that you feel may be appropriate.

9.6 Appendix D1: Items that Adopted from Previous Studies.

Constructs	Scales	Adapted source
Compatibility	• Using the new system is compatible with all aspects of my work • New system is easily connected with existing communication network of our company • New system is compatible with my firm's values and beliefs	Ifinedo (2011); Kim and Lee (2008); Lian et al. (2014); Moore and Benbasat (1991); Premkumar and Ramamurthy (1995); Premkumar and Roberts (1999); Thiesse et al. (2011); and Yu-hui (2008).
Complexity	• Using the new system is too complex for business operations • The skills needed to adopt the new system are too complex for employees of the firm • The complexity of system integration	Lian et al. (2014); Premkumar and Roberts (1999); Thompson et al. (1991); Thiesse et al. (2011); and Yu-hui (2008).
Cost	• The cost of cloud computing technology user training • Reduction of energy and environmental costs • Maintenance costs of the new system are very low	Kuan and Chau (2001); Lian et al. (2014); and Premkumar and Roberts (1999).
Security concern	• Using the new system solutions is trustworthy • The new system provide sufficient security transfer channel during the process of mass data interchange	Lian et al. (2014); Soliman and Janz (2004); and Zhu et al. 2006a.
Top management support	• Top management is seriously considering the adoption of appropriate IT in our company • The company management is willing to take risks (financial and organizational) involved in the adoption of the new system • Top management provide resources in adopting new system • Top management understand the benefits of the new system	Kim and Lee (2008); Lian et al. (2014); Oliveira and Martins (2008), (2009), (2010); Premkumar and Roberts (1999); Thong (1999); and Yu-hui (2008).
Organisation size	• The number of company employees • Annual business volume	Pan and Jang (2008); Premkumar and Roberts (1999); Thong (1999); and Wang et al. (2010).
Employees' knowledge	• Previous IS development experience of IS staff • The ability of IS staff in supporting the new system development • Employees who have more knowledge about IS air likely to more adoption	Kuan and Chau (2001); Lin and Lin (2008); Thong (1999).
Government regulation	• Government effectively promotes new system adoption • The data protection policies are regulated	Ifinedo (2011); Kuan and Chau (2001); Pan and Jang (2008); Yu-hui

		(2008); and Zhu and Kraemer (2005).
Information intensity	• Customers have much information required in the purchase of products or services • The companies in the same industry as our company have much information required in the change of trading partners • The customers and companies in the same industry as our company rely on each other for obtaining the information regarding products or services	Chong et al. (2009); Kim and Lee (2008); and Thong (1999).
Anticipated benefit	• Improve data accuracy • Improve security of data • Speed up application process • Improve customer services	Beatty et al. (2001); Kuan and Chau (2001); Lian et al. (2014); Lin and Lin (2008); and Zhu et al. (2003).

9.7 Appendix E1: Survey Participant Information Sheet.

USQ

AUSTRALIA

University of Southern Queensland

The University of Southern Queensland
Survey Participant Information Sheet

The USQ HREC Approval Number: H14REA079

Invitation to participate in research study:

The Perceived Benefits of Cloud Computing for Regional Municipal Government and Barriers to Adoption

I invite you to take part in this research study.

- **Procedures**

This Participant Information Sheet provides information for participants so they are fully aware of their involvement in this research study. You need to be informed of what is expected from participation and can then freely decide whether you wish to consent to participate.

The research study is to being conducted by Omar Ali as part of Doctor of Philosophy Degree supervised by Professor Jeffrey Soar in the School of Management and Enterprise, Faculty of Business, Education, Law and Arts, University of Southern Queensland (USQ).

- **Aims**

The aims of this research study are to explore the potential of cloud computing in Australian regional municipal governments, with a specific focus on Queensland local governments. The study seeks to address and identify the key factors that are perceived to influence the adoption of cloud computing, including challenges and issues and current e-government technologies employed. This research study is expected to contribute information that can assist in making investment decisions on cloud computing.

There will be a risk of a minor time imposition for participants. Participation is entirely voluntary; there are no consequences for non-participation, no personally-identifying data will be captured, data will be anonymised.

Participation involves completion of a questionnaire about cloud computing adoption, processes, situations or projects that you may have been involved in. Potential participants have been selected from Australian regional and municipal governments. The questionnaire link will be distributed to you by email. Total time commitment is approximately 10-12 minutes.

- **Voluntary Participation**

Participation in this research study is voluntary, and any participant is free to participate or free to withdraw from the research at any time. Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your treatment and relationship with the USQ or where you are employed.

Throughout the research as much feedback as possible will be given to any participant who requests results of the survey or the outcome of this research, and this process will be conducted by email. This cooperative approach and mutual understanding is central to the success of this research study.

Please notify the researcher if you decide to withdraw from this research study.

Omar Ali
School of Management and Enterprise
Faculty of Business, Education, Law, and Arts
University of Southern Queensland,
West Street, Toowoomba, Qld, 4350, Australia
Phone No. 7 4631 5387
Email: Omar.Ali@usq.edu.au

Should you have any queries regarding the progress or conduct of this research study, you can contact the principal supervisor:

Supervisor: Professor Jeffrey Soar
School of Management and Enterprise
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If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the USQ Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba, Qld, 4350
Phone: +61 7 4631 2690
Email: ethics@usq.edu.au

This information sheet is for you to keep

9.8 Appendix E2: Survey Consent Form.

University of Southern Queensland

The University of Southern Queensland
Survey Consent Form

The USQ HREC Approval Number: H14REA079

TO: Participants,

The Perceived Benefits of Cloud Computing for Regional Municipal Government and Barriers to Adoption

Researcher: Omar Ali
Phone No. 7 4631 5387
Email: Omar.Ali@usq.edu.au

Supervisor: Professor Jeffrey Soar
Phone No. 7 4631 1255
Email: Jeffrey.Soar@usq.edu.au

I have been given information about "*The Perceived Benefits of Cloud Computing for Regional Municipal Government and Barriers to Adoption"* and discussed the research study with Omar Ali who is conducting this research study as part of a Doctor of Philosophy Degree supervised by Professor Jeffrey Soar in the School of Management and Enterprise, Faculty of Business, Education, Law and Arts, University of Southern Queensland (USQ). I understand the purpose of this research study and my involvement in it.

I understand that there are no potential risks or burdens associated with this research study, and have had an opportunity to ask Omar Ali any questions I may have about the research and my participation.

I understand that my participation in this research study is voluntary and I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect either my treatment or my relationship with the organisation at which this research study is conducted and with I am employed.

By signing below I am indicating my consent to participate in the research. I understand that the data collected from my participation will be used primarily for the Doctor of Philosophy thesis, and will also be used in summary form for journal or conference publication, and I consent for it to be used in that manner.

Name of participant: ………………………………………………………………...

Signed: …………………………...……………….. Date: …………………………….

9.9 Appendix E3: Questionnaire

USQ
AUSTRALIA

University of Southern Queensland

The University of Southern Queensland

Survey Questionnaire

Dear Participants,

You are invited to participate in a research study which aims to explore the potential of cloud computing in Australian regional municipal governments. It also aims to identify factors that are perceived likely to influence the adoption of cloud computing.

Completion of the survey is expected to take 10-12 minutes.

All information provided will remain confidential and only aggregate data will be published. In other words, no individual information will be released to any third party.

Thank you for taking the time complete the questionnaire. Your views are critical to the success of this research study.

Yours sincerely,

Omar Ali
PhD Candidate
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A. Respondent's Background

Definition of Cloud Computing: A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, server, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

1. Please tick the item that best describes your role in the field of IT.

- ☐ Management
- ☐ Systems development/ Analyst/ Programmer
- ☐ Operations/ Systems administrator/ User support
- ☐ Other (please specify) ____

2. How would you rate your knowledge of cloud computing?

- ☐ I have no knowledge about cloud computing
- ☐ I have little knowledge about cloud computing
- ☐ I have some knowledge about cloud computing
- ☐ I have a good knowledge about cloud computing
- ☐ I have an excellent knowledge about cloud computing

3. Number of total years' experience with cloud computing projects?

- ☐ Never
- ☐ Less than 1 year
- ☐ 2-5 years
- ☐ 6-10 years
- ☐ 11-14 years
- ☐ More than 14 years

B. Information About Participants' Council's

4. What is the size of your organisation in terms of number of employees?

- ☐ Extra small (Less than 50)
- ☐ Small (51-100)
- ☐ Medium (101-250)
- ☐ Large (251-750)
- ☐ Very large (751-1500)

5. Has your organisation adopted cloud computing technology?

- ☐ Yes (*Go to Q6*)
- ☐ No (*Go to Q10*)
- ☐ Not sure (*Go to Q10*)

6. What is the current level of cloud computing deployment within your organisation?

- ☐ Full adoption for some services
- ☐ Some adoption
- ☐ Still in pilot test stage
- ☐ Not adopted
- ☐ Not sure

7. What type of cloud service/delivery model does your organisation use? *(Tick all items that are applicable).*

- ☐ Software-as-a-Service
- ☐ Platform-as-a-Service
- ☐ Infrastructure-as-a-Service
- ☐ Other (please specify):____

8. What type of cloud deployment model does your organisation use? *(Tick all items that are applicable).*

- ☐ Private cloud
- ☐ Public cloud
- ☐ Hybrid cloud
- ☐ Community cloud
- ☐ Not sure

9. What cloud based applications are used by your organisation? *(Tick all that apply)*

- ☐ Email
- ☐ Email marketing
- ☐ SMS/text messaging
- ☐ Telephone service/VoIP
- ☐ Web conferencing
- ☐ Social networking/Web 2.0
- ☐ Media monitoring
- ☐ Office productivity
- ☐ Project management
- ☐ Accounting management
- ☐ Grant management
- ☐ Donor management
- ☐ Volunteer management
- ☐ Human resources
- ☐ Client/member database/CRM
- ☐ Payroll
- ☐ Billing and invoicing
- ☐ Data analytics
- ☐ Training
- ☐ Security
- ☐ Data backup/storage/sync
- ☐ Disaster recovery
- ☐ File storage/sharing
- ☐ Website hosting
- ☐ Collaboration software
- ☐ E-commerce processing
- ☐ Remote access/VPN
- ☐ Compliance
- ☐ Other (please specify):____

10. Is your organisation planning to adopt a cloud based services solution in the near future?

- ☐ Yes
- ☐ No
- ☐ Not sure

C. Factors to be Considered in the Adoption of Cloud Computing

Strongly Un-important	Un-important	Slightly Un-important	Neutral	Slightly Important	Important	Strongly Important
1	**2**	**3**	**4**	**5**	**6**	**7**

11. In terms of importance, please rate the following factors that need to be considered for the adoption of cloud computing.

Item	1	2	3	4	5	6	7
Internet connectivity	○	○	○	○	○	○	○
Availability	○	○	○	○	○	○	○
Reliability	○	○	○	○	○	○	○
High performance	○	○	○	○	○	○	○
Latency	○	○	○	○	○	○	○
Cost	○	○	○	○	○	○	○
Data storage location	○	○	○	○	○	○	○
Integration	○	○	○	○	○	○	○
Security	○	○	○	○	○	○	○
Data backup	○	○	○	○	○	○	○
Data sovereignty	○	○	○	○	○	○	○
Provider dependability	○	○	○	○	○	○	○
Employees' knowledge	○	○	○	○	○	○	○
Transportability	○	○	○	○	○	○	○

D. Challenges and Issues that Influence the Adoption of Cloud Computing

12. In terms of importance, please rate the following challenges and issues likely to influence the adoption of cloud computing.

Item	1	2	3	4	5	6	7
Effective network	○	○	○	○	○	○	○
Availability of different providers	○	○	○	○	○	○	○
Data storage location	○	○	○	○	○	○	○
Cost	○	○	○	○	○	○	○
Security	○	○	○	○	○	○	○
Loss of control over data and applications	○	○	○	○	○	○	○
Privacy	○	○	○	○	○	○	○
Trust	○	○	○	○	○	○	○
Backup	○	○	○	○	○	○	○
Integration	○	○	○	○	○	○	○
Policy maker	○	○	○	○	○	○	○
Lack of real understanding of cloud	○	○	○	○	○	○	○
Business transformation	○	○	○	○	○	○	○

E. Research Model Constructs

Often when new IT investments such as cloud computing are made, or are being considered, organisations will look at various innovation characteristics; technological factors; organisational factors; environmental factors; and benefit characteristics.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

❖ Innovation Characteristics

13. Please rate the following statements regarding cloud computing ***compatibility***.

Item	1	2	3	4	5	6	7
Cloud computing is easily connected with the existing IT infrastructure of my organisation	○	○	○	○	○	○	○
Using cloud computing system is compatible with all aspects of my organisation	○	○	○	○	○	○	○
Cloud computing is compatible with my organisation's values and beliefs	○	○	○	○	○	○	○
Cloud computing compatibility is not an issue for my organisation	○	○	○	○	○	○	○

14. Please rate the following statements regarding the ***complexity*** of cloud computing.

Item	1	2	3	4	5	6	7
Using cloud computing system is not seen as complex for business operations in my organisation	○	○	○	○	○	○	○
The skills needed to adopt cloud computing are not seen as complex for employees in my organisation	○	○	○	○	○	○	○
Compared to other types of technologies cloud computing is less complex	○	○	○	○	○	○	○
Integration of cloud computing with the existing IT system presents no problems for my organisation	○	○	○	○	○	○	○
Cloud computing complexity is not an issue for my organisation	○	○	○	○	○	○	○

❖ Technological Factors

15. Please rate the following statements regarding the ***cost*** of cloud computing.

Item	1	2	3	4	5	6	7
Maintenance costs of cloud computing system are very low	○	○	○	○	○	○	○
Energy and environmental costs of cloud computing system are very low	○	○	○	○	○	○	○
Cloud computing has low training costs	○	○	○	○	○	○	○
Cloud computing decreases the investment cost in new IT infrastructure	○	○	○	○	○	○	○
Cloud computing reduces the costs of systems upgrades	○	○	○	○	○	○	○
Cloud computing is cost effective compared with the other IS technologies	○	○	○	○	○	○	○
Cloud computing reduces the total cost of operational processes	○	○	○	○	○	○	○

16. Please rate the following statements regarding ***security concerns*** related to cloud computing.

Item	1	2	3	4	5	6	7
Cloud computing provides a sufficient security transfer channel during the process of mass data interchange	○	○	○	○	○	○	○
Using cloud computing system solutions is trustworthy	○	○	○	○	○	○	○
Cloud computing provides a secure service	○	○	○	○	○	○	○
Cloud provider data centres provide greater security of data	○	○	○	○	○	○	○
Cloud provider data centres have effective redundancy	○	○	○	○	○	○	○
Cloud provider data centres have effective backup systems	○	○	○	○	○	○	○
Cloud providers maintain the privacy of an organisation's data	○	○	○	○	○	○	○
Cloud providers maintain effective data confidentiality	○	○	○	○	○	○	○
Security concerns are not an issue with cloud computing	○	○	○	○	○	○	○

❖ Organisational Factors

17. Please rate the following statements regarding the ***top management support*** within your organisation when it is adopting cloud computing.

Item	1	2	3	4	5	6	7
Top management is willing to take the risks (financial and organisational) involved in adopting cloud computing	○	○	○	○	○	○	○
Top management is seriously considering the adoption of an appropriate cloud system in my organisation	○	○	○	○	○	○	○
Top management understands the benefits of cloud computing systems	○	○	○	○	○	○	○
Top management provides resources to support the adoption of cloud computing	○	○	○	○	○	○	○

18. Please rate the following statements regarding the ***organisation's size*** when adopting cloud computing.

Item	1	2	3	4	5	6	7
The number of employees in my organisation is high compared to others in the industry	○	○	○	○	○	○	○
The revenue of my organisation is high compared to others in the industry	○	○	○	○	○	○	○
Small organisations are more flexible in adopting cloud computing	○	○	○	○	○	○	○

Bigger organisations with larger resources can easily move to adopt cloud computing	○	○	○	○	○	○	○
The size of an organisation impacts its adoption of cloud computing	○	○	○	○	○	○	○

19. Please rate the following statements regarding your organisation's ***employees' knowledge*** when adopting cloud computing.

Item	1	2	3	4	5	6	7
The IS staff in my organisation have the ability to support cloud computing system development	○	○	○	○	○	○	○
The IS staff in my organisation have previous IT development experience	○	○	○	○	○	○	○
Organizations with employees who have more knowledge about CC are likely to more adoption	○	○	○	○	○	○	○
Employee knowledge in my organisation plays a massive role in the adoption of CC	○	○	○	○	○	○	○

❖ Environmental Factors

20. Please rate the following statements regarding ***government regulation*** when adopting cloud computing.

Item	1	2	3	4	5	6	7
Government effectively promotes cloud computing adoption	○	○	○	○	○	○	○
The data protection policies are regulated by government	○	○	○	○	○	○	○
Government regulations can provide a better process for adopting cloud computing	○	○	○	○	○	○	○
Current government policy is focused on privacy	○	○	○	○	○	○	○
Current government policy is focused on security	○	○	○	○	○	○	○
Current government policy is focused on all of the risk factors	○	○	○	○	○	○	○
There is no specific government policy on adoption of cloud computing	○	○	○	○	○	○	○

21. Please rate the following statements regarding the ***information intensity*** needs of your organisation.

Item	1	2	3	4	5	6	7
The users and organisations in the same industries as my organisation rely on each other for information regarding services	○	○	○	○	○	○	○
Users have access to sufficient information on how to use services	○	○	○	○	○	○	○
Organisations in the same sector as my organisation can access sufficient information to support a change in services provided	○	○	○	○	○	○	○
My organisation is dependent on up-to-date information	○	○	○	○	○	○	○

❖ Benefits Characteristics

22. Please rate the following statements regarding the ***anticipated benefits*** once cloud computing is implemented.

Item	1	2	3	4	5	6	7
Using cloud computing system provides better services	○	○	○	○	○	○	○
Using cloud computing system improves operational efficiency	○	○	○	○	○	○	○
Using cloud computing system speeds up application processes	○	○	○	○	○	○	○
Using cloud computing system improves data accuracy	○	○	○	○	○	○	○
Using cloud computing system improves flexibility	○	○	○	○	○	○	○
Using cloud computing system improves availability of services	○	○	○	○	○	○	○
Using cloud computing system improves storage capacity	○	○	○	○	○	○	○
Using cloud computing system improves security of data	○	○	○	○	○	○	○
Using cloud computing system reduces the level of risk	○	○	○	○	○	○	○
Using cloud computing system improves disaster recovery and backup	○	○	○	○	○	○	○
Using cloud computing system provides cost reductions	○	○	○	○	○	○	○
Using cloud computing system reduces IT infrastructure	○	○	○	○	○	○	○
Using cloud computing system provides remote access	○	○	○	○	○	○	○

Using cloud computing system reduces staff	○	○	○	○	○	○	○
Using cloud computing system provides time efficiencies	○	○	○	○	○	○	○

❖ Cloud Adoption

23. Please rate the following items regarding the ***cloud adoption*** needs for your organisation.

Item	1	2	3	4	5	6	7
Communications (email, telephone services, web conferencing, social networking, media monitoring)	○	○	○	○	○	○	○
Data storage (security, data backup, disaster recovery)	○	○	○	○	○	○	○
Office productivity (file sharing, collaboration software, management, human resources)	○	○	○	○	○	○	○

❖ Other Comments

9.10 Appendix F1: USQ HREC Approval Letter.

OFFICE OF RESEARCH
Human Research Ethics Committee
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UNIVERSITY OF SOUTHERN QUEENSLAND
AUSTRALIA

24 April 2014

Mr Omar Ali
1/61 Kearney Street
KEARNEY SPRINGS QLD 4350

Dear Omar

The USQ Human Research Ethics Committee has recently reviewed your responses to the conditions placed upon the ethical approval for the project outlined below. Your proposal is now deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethical approval has been granted.

Approval No.	**H14REA079**
Project Title	Development and evaluation of a strategy for e-government through cloud computing to support regional resilience
Approval date	24 April 2014
Expiry date	24 April 2017
HREC Decision	**Approved**

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website:
http://www.usq.edu.au/research/ethicsbio/human

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Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

Annmaree Jackson
Ethics Coordinator

Copies to: U1054317@umail.usq.edu.au