UNIVERSITY OF SOUTHAMPTON

FACULTY OF PHYSICAL SCIENCES AND ENGINEERING

Department of electronics and computer science

A model for Cloud Computing Adoption by Saudi Government Overseas Agencies

by

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ABSTRACT

FACULTY OF PHYSICAL SCIENCE AND ENGINEERING

A MODEL FOR CLOUD COMPUTING ADOPTION BY SAUDI GOVERNMENT OVERSEAS AGENCIES

Ahmed Nammas Albugmi

There are benefits and challenges in cloud computing adoption, which could be affected by technological, environmental, organisational and societal factors. Cloud computing adoption has been sufficiently investigated; however, there is dearth of empirical research on cloud computing adoption in public sector organisations of developing countries that operate overseas such as embassies, trade and commerce offices and cultural bureaus.

The aim of this study is to empirically identify factors that significantly influence the adoption of cloud computing in government organisations overseas.

The methodology of this cross sectional study includes use of mixed method approach and data triangulation using exploratory semi-structured interviews with 10 IT experts, evaluation of a cloud computing research framework by 37 IT experts and an online questionnaire survey involving a convenience sample of 226 employees working in different overseas organisations of Saudi Arabian government. The survey data were analysed using the exploratory factor analysis (EFA) and followed by confirmatory factor analysis (CFA) and structural equation modelling (SEM).

The results showed cloud computing adoption has statistically significant positive association with top management support (β=0.7, $p < 0.001$), data security (β=0.678, $p < 0.001$), trust (β=0.58, $p = 0.001$), cost of infrastructure (β=0.479, $p = 0.001$), usefulness of the system (β=0.449, $p < 0.001$), privacy (β=0.362, $p = 0.001$) organisation size (β=0.299, $p = 0.001$), employee readiness (β=0.26, $p = 0.006$) and quality of service (β=0.184, $p = 0.009$). Cloud computing adoption has statistically significant but negative association with culture of the home country (i.e. Kingdom of Saudi Arabia) (β= -0.689, $p = 0.001$), legal and policy concerns (β= -0.559, $p = 0.001$), lack of IT standards (β= -0.519, $p < 0.001$), employee resistance (β= -0.364, $p = 0.016$), expandability of application to the cloud (β= -0.186, $p = 0.015$) and government intervention (β= -0.083, $p = 0.001$). There was no statistically

significant association between cloud computing adoption and vision of an organisation (β= -0.083, p = 0.233), culture of (Saudi) government organisations overseas (β= -0.08, p = 0.214), change management competences (β= -0.038, p = 0.879) and internet speed and reliability (β= -0.014, p = 0.829).

The present study has identified that top management support, data security, and cost of infrastructure are the three critical factors that could promote cloud computing adoption decisions in overseas government organisations of developing countries such as Saudi Arabia. However, the major barriers in cloud computing adoption culture in these organisations include the home country and legal and policy concerns, which need to be considered by managers and policy makers interested in cloud computing adoption. In addition, cloud computing services providers should address the critical barriers especially the lack of IT standards that have been identified as a key factor having a significant negative association with cloud computing adoption.

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Declaration of Authorship

I, Ahmed Nammas Albugmi

Declare that this thesis and the work presented in it are my own and have been generated by me as the result of my own original research.

A model of Cloud Computing Adoption by Saudi Government Overseas Agencies

I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University;
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- Where I have consulted the published work of others, this is always clearly attributed;
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- Parts of this work have been published as:

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Signed: .....

Date: .....

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Abbreviations

KSA	kingdom of Saudi Arabia
CSP	Cloud Service Provider
IaaS	Infrastructure as a Service
PaaS	Platform as a Service
SaaS	Software as a Service
NIST	National Institute of Standards and Technology
ICT	Information and communications technology
MULTICS	Multiplexed Information and Computing Service
TOE	Framework of Technological-Organisation-Environment
SPSS	Statistical Package for the Social Sciences
SGOA	Saudi Government Overseas Agencies
SLA	Service Level Agreement
EFA	Exploratory factor Analysis
CCA	Cloud Computing Adoption
SEM	Structural Equation Modelling
CR	Composite Reliability
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis

Chapter 1 Introduction

1.1 Background

There are many issues that can contribute to the adoption or rejection of cloud computing, including compliance and legal challenges, security challenges and other organisational based aspects (Andrei, 2009; Buyya et al., 2008; Catteddu, 2010; Khajeh-Hosseini et al., 2010a). Not only are these considerations for all organisations considering adoption of the cloud, for Saudi organisations operating overseas they may present specific concerns. Which issues are most salient, and what decisions are ultimately made, depends greatly on the specific context of a given organisation.

Evidence suggests that organisations still using outdated technologies tend to give cloud computing priority acceptance because of the need to update (Schneier, 2008). However, this means that they are faced with considerations of risk in relation to the security and other issues, even though it is possible to mitigate these risks.

Therefore, the adoption of cloud computing depends on how a given organisation measures the risks in a specific situation, as well as the available forms of mitigation and the nature of the risk itself. If customers can identify the risks in a given situation and make informed decisions as to what degree of risk they are prepared to accept, then they will feel safer and more secure when using cloud computing technology. The prospect of contributing to better understanding and decision-making in this way is the reason that this project appeals to the researcher, who aims to build a framework of factors for consideration which ought to influence the adoption of cloud computing.

The risks associated with the adoption of cloud computing can be illustrated by considering historical examples. To date there have been no violations or contract breaches recorded; however, several instances of possible power outages of cloud and even the loss of service are a cause for concern which has created a feeling of distrust with the technology. In one case, a Microsoft sidekick remained a cloud customer for a period of only six days when a customer’s data was lost due to the failure of the system - a claim made by Microsoft on March 13 2009. On October 16 2008, an outage attempt caused the loss of emails and data to customers who were unable to access the application Google Mail. In 2010, the services to 68 thousand customers of salesforce.com were disrupted, causing concern regarding the security, privacy; trust of cloud computing subsequently became an issue to this company's customers (Ferguson-Boucher, 2011). Another example was reported by Williams in 2010 regarding the loss of data by the company Microsoft Azure (Williams, 2010).

The process of installation designed to implement cloud computing must be one which covers the evaluation of all challenges and highlights any critical points which may potentially pose problems and complications in the delivery of services to customers through the deployment of cloud computing. In addition, it must provide solutions which minimise the occurrence of these problems on the adoption of cloud computing.

Specific risks associated with cloud computing include the following (Stavinoha, 2013):

1. Security Risks

Because cloud services are delivered and maintained by a third-party provider, the organisation has no control over its security measures. This can cause a concern for cloud customers in organisations that use cloud computing for critical business functions.

2. Privacy

Encryption of data is crucial especially in the cloud which is an environment shared with other customers' data. Therefore, in order to ensure confidentiality and privacy of data while in transit and in storage it is essential to encrypt and protect the data.

3. Regulatory Compliance

Since customer organisations are responsible for the security of their own data (even though it is managed by another service provider), they need to ensure adequate security protocols in order to ensure that they comply with domestic and international regulatory requirements.

4. Business Continuity Plan

In case there is a security breach, the organisation must have certain protocols in place for the provider to implement in order to protect the data while continuing to provide services.

Without cloud computing, organisations can face certain disadvantages: since their data is stored in a physical location, it makes it difficult to retrieve for remote access users; if their data storage is damaged or destroyed, they may have difficulty with data recovery; software updates are time-consuming; data sharing is complicated; physical storage consumes more energy which is harmful for the environment; it is costly to upgrade and maintain; offers limited storage capacity. Therefore, cloud computing can not only help organisations be more efficient, but it can also help them to avoid many risks (Salimi et al., 2012).

1.2 Research problem

In the domain of information systems (IS), one of the latest significant developments is cloud computing. According to the US National Institute of Standards and Technology (NIST), Cloud computing refers to an IS model that provides a convenient, rapid and on demand access to a network or shared pool of configured computing resources involving a little management and interaction for service provision (Mell and Grance, 2011).

The key characteristics of cloud computing include on demand or self-service round the clock availability, efficient computing resource pooling, ubiquitous and broad network accessibility, rapid service provision elasticity and services use measuring from the perspectives of service users and providers (Mell and Grance, 2009). Thus, cloud computing could help in improving efficiency and effectiveness, hence, its adoption by government and private organisations is increasing (Albar and Hoque, 2015).

However, the adoption and implementation of cloud computing has been slow due to a number of factors such as trust, privacy, hosting issues and data protection legislation (Dillon et al., 2010; Foster et al., 2008; Subashini and Kavitha, 2001). In addition, social and cultural values and traditions could also affect the adoption of new technologies such as cloud computing (Alharbi, Atkins and Stanier, 2016; Wu et al., 2013; Sultan and van de Bunt-Kokhuis, 2012; Low, Chen and Wu, 2011).

A review of literature undertaken by the researcher shows that empirical research on cloud computing has focused on cloud computing promoting models, strategies and frameworks (Alateeyah, 2014; Takabi et al., 2010; Zissis and Lekkas, 2012) and financial aspects of cloud computing (Armbrust et al. 2010).

There is however a dearth of empirical studies on cloud computing from the perspectives of organisational culture in the context of developing countries. In addition, there has been little research on the influence of regulatory, trust, security and privacy factors on the adoption of cloud computing. Similarly, there is a need for empirical research on how cloud computing affects organisational performance in different cultural and organisational contexts. More importantly, there is lack of empirical research on cloud computing in developing countries' public sector organisations that operate overseas such as embassies, trade and commerce offices and cultural bureaus.

The present empirical study will fill this gap in the literature by empirical study of factors that affect adoption of cloud computing in specific cultural and organisational context of Saudi government organisations and agencies that operate outside of Saudi Arabia.

1.3 Research questions

Towards understanding and facilitation of the adoption of cloud computing for Saudi Government agencies, the following research questions need to be addressed:

1. What is an appropriate cloud computing framework to support the Saudi Government agencies overseas?
2. What are the key factors that influence the adoption of cloud computing at Saudi Government agencies overseas?

1.4 Objectives and aims

Based on the problem statement, the broad aim of this study is to identify the factors that influence the adoption of cloud computing in Saudi government Agencies overseas. The specific objectives of this study are as follows:

1. To develop a comprehensive framework which can assess the cloud computing's readiness for the Saudi government Agencies overseas.

2. To investigate the factors, including organisational, technical, environmental and cultural pressures, which influence the adoption of cloud computing.

1.5 Scope of the study

Cloud computing is a developing computer software technology which is currently being applied to support and manage the data used within many organisations. However, there are a number of challenges to the successful application of cloud technologies, which require further research. The main issues relate to the security, privacy, physical location and socio-technological factors which have the potential to impact negatively on the large-scale deployment of data management services in various organisations. Therefore, the focus of this research is to gain an understanding of the requirements and expectations that Saudi government overseas agencies have of cloud computing and the associated factors that affect adoption through the application of a comprehensive model, consisting of technological, social and environmental factors.

Furthermore, the study will also offer guidelines for Saudi government overseas agencies to evaluate and implement cloud computing. This project will not assess the software implementation of cloud computing; only the organisational, technological and environmental factors will be assessed, along with an evaluation of the feasibility of adopting cloud computing. Thus, the

guidelines will allow policy makers and managers at Saudi government agencies overseas to understand the challenges they face when implementing cloud computing and will provide the solutions to overcome these challenges.

1.6 Thesis report structure

The chapters of this thesis are structured as follows:

- **Chapter One** provides the background to the research. It describes the rationale behind the research into cloud computing, such as the challenges it presents in a Saudi context. It also explains the research problem, along with setting out the aims and objectives.

- **Chapter Two** is the literature review. This will focus on cloud computing, including the history of cloud computing, its essential characteristics, and a range of cloud computing models. The importance of security in the cloud will be addressed, and the major security challenges will be presented, such as malicious attacks and data interception.

- **Chapter Three** sets out the theoretical framework and the various factors that have an impact on the introduction of cloud computing according to the review of the literature. Issues such as the vision of the organisation, the environment, and employee readiness will be assessed.

- **Chapter Four** describes the research methods and the approaches used, both quantitative and qualitative, as a mixed methods approach is the most appropriate for this study. In addition, the development of the research instruments will be explained, including the design of the questionnaire.

- **Chapter Five** will present the results and the discussion. The data gained from the questionnaire will be analysed using a t-test, and the data from the interviews will be presented according to the emergent themes. The key factors that have an impact on the cloud will be addressed, from technology and data security to organisational culture and competencies. Finally, the revised framework will be presented, based on the data obtained.

- **Chapter Six** This chapter explains the research methodology applied in the second stage of the researched which was used to evaluate the proposed model and test the research hypothesis. It starts with a short introduction to the research methodology and the right way of research that matches the consent. It also outlines and explains the research strategy used and the layout of the questionnaires. The following chapter also explains the sample size which was used for the following research measuring the amount of reliability to be placed upon the test results. In the end, the process for data analysis is discussed and evaluated.

- **Chapter 7**: This chapter presents data analysis including Structural Equation Modelling (SEM) that was carried out on the data obtained from 226 participants through a Cloud Adoption Instrument. This section presents preliminary analysis of the survey data and an introduction to the technology adoption instrument that was developed and validated. Thus, this chapter included data analysis comprising respondents' characteristics, reduction of data dimensions using the Exploratory Factor Analysis (EFA) as well as the Confirmatory Factor Analysis (CFA) and SEM, which were applied to measure how the measurement variables represented the underlying latent constructs (factors).

- **Chapter 8**: In this chapter, the findings of the study are discussed in relation to the empirical literature and theory. The chapter starts with a summary of the findings of the study. It discusses in detail the investigation of the factors, including organisational, technological, environmental and cultural pressures, which influence the adoption of cloud computing in Saudi Government Agencies Overseas.

  The Structural Equation Modelling (SEM) technique is used to test the hypotheses. This is based on the fact that the study entails analysing relationships between measurement variables and latent constructs; and relationships amongst the latent constructs.

  Chapter 9: This chapter presents the conclusion and discusses the contributions of this research with Implications of the study to practice of providers, technology consultants, and government. Also presents suggests the roadmap for future work and the end of this chapter present the lessons from the research.

Chapter 2 Literature Review of Cloud Computing

2.1 Cloud computing

Cloud computing has received attention from the stakeholders of business organisations, institutions, information technology companies and academicians. The major investment organisations are putting their trust and investment in cloud computing and this is mainly due to cloud computing being quoted as "A new economic model of cloud computing for Information and communications technology (ICT)." In this model, the computing is allowed to bypass an investment i.e., there is no need to invest in limited internally managed IT resources. However, the working company needs to outsource and chase the needs of IT resources and back up by using cloud computing as a provider and pay as they use. This new archetype of computing has posed many challenges to the organisations who are considering to adopt it. The major identified challenges include; security, trust, compliance, legal and other organisational management challenges. Almost all of the challenges given here are in relation to trust. (Pearson, S. and Benameur, A., 2010).

This chapter will describe the background material. In first section, cloud computing has been defined, followed by a short history, related technologies and delivery model, along with services, has been outlined. The second section illustrates the concept of trust with particular emphasis on computer systems. This section is also extended to highlight the challenges in establishing trust and propose ways of maintaining the trust in cloud computing.

2.2 Advent of the cloud computing era

Cloud computing can be traced and found as far back as the early sixties when time sharing and utility computing were first introduced, for example, cloud computing has existed in various forms since the beginning of computing technologies. There was a time when MULTICS was considered as the holy grail of the field. However, this project failed as it was launched quite ahead of its time of need and existence (MIT, 2009). During that time when no access to the Internet for the public, poor communication systems or high speed processing capacities were needed, time sharing and multitasking emerged in software sciences, though concepts were emerging from scratch they formed the initial concept of cloud computing (Wang & Laszewski, 2008).

The first commercial company Tymeshare Inc (founded in 1966), rented out the processing power and storage space using a telephone line (Bhattacharjee, 2009). The personal computers which emerged in the eighties and nineties witnessed the dot-com era and were parallel with other inventions such as grid computing. Grid computing was designed on the basis of algorithms to link

and share the computer's resources, whereas the dot-com bubble matured and led to the introduction of datacentres. However, these datacentres emerged to form the virtualisation technology which has evolved into the current cloud computing technology (Bhattacharjee, 2009).

For the very first time in 1999, Mac Andersen founded the loudcloud, which was aimed at launching the "Web's next power play: custom-design, infinitely scalable sites that blast off a virtual assembly line" (Jones, S. ed., 2002).

2.3 Defining cloud computing

As stated previously, cloud computing as a term is fuzzy since it has borrowed various concepts and terms from other sister paradigms in computer sciences i.e., different definitions of cloud computing exist narrated by industry experts and researchers. Richard Stallman 'the creator of the operating system GNU' says "It is stupidity; it's worse than stupidity: it's a marketing hype campaign." (Johnson, 2008). The founder of Oracle, Larry Ellison, is of the view that everything has been done up to now to improve the service quality of cloud computing, and so now we are wondering about what to do about changing the words in advertisements (Farber, 2008). These claims are just a few examples of how some famous experts look at cloud computing.

2.4 Cloud computing: multiple perspectives; multiple origins

The first academic definition of cloud computing refers to "a computing paradigm where the boundaries of computing will be determined as rationale rather than technical" (Chellapa, 1997).

Gartner Consulting defined cloud computing as "A style of computing where scalable and elastic IT-related capabilities using Internet technologies are provided as-a-service to multiple external customers" (Plummer et al., 2009). This computing model consists of five important characteristics. Also, the computing comes along "three service models and four deployment models" (Mell & Grance, 2009a, 2009b).

These versatile definitions show that cloud computing is viewed from different perspectives by stakeholders and researchers belonging to various industries and research organisation, such as consumers, engineers, managers, architects, developers and academicians (CSA, 2009). With this short preamble to cloud computing, here in this dissertation we define cloud computing as a computing model consisting of attributes which include outsourcing of data, computing resources with scalability and providing these resources with no upfront cost. The cost factor may, however, be manipulated in that institutions and organisations may need better value for money from their

investments in information technology. Figure 2-1 demonstrates the different perspectives and multiple origins adopted in the use of cloud computing.

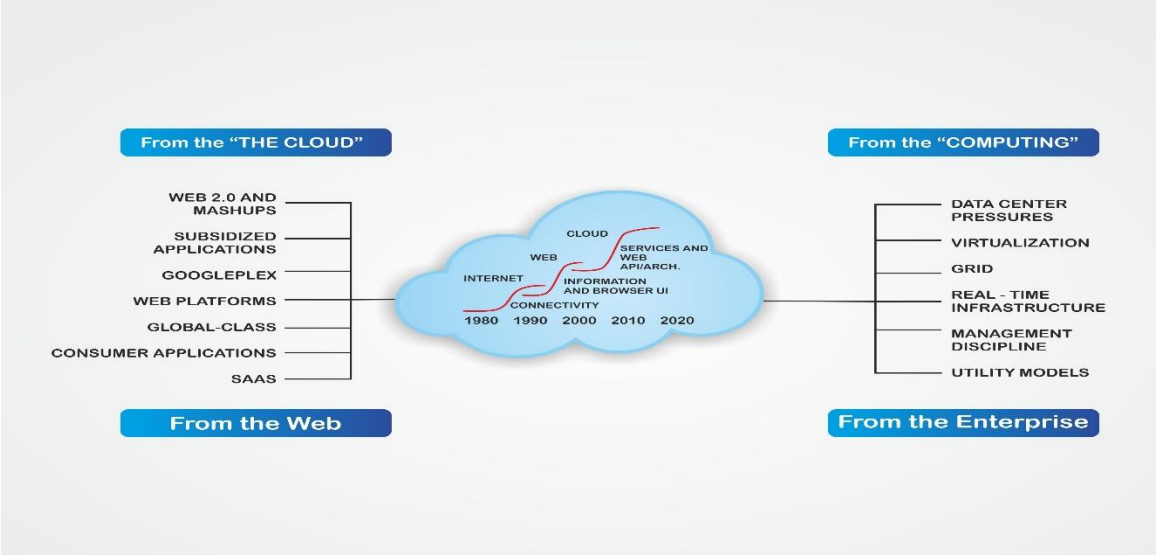

Figure 2-1 the various perspectives adopted on the utility of cloud-computing (Avram, 2014).

2.4.1 Characteristics of cloud computing

Many characteristics of cloud computing - both common and essential - are different from other computing tools (Plummer et al., 2009). The essential and common characteristics of cloud computing are described below:

2.4.2 Essential characteristics

The five essential characteristics of cloud computing are given below:

Rapid Elasticity*:* Rapid elasticity means the capacity to provide, 'scaling in and scaling out capabilities 'and 'provisioning to the client' seems unlimited and can be purchased as per demand (Plummer et al., 2009).(Erl, Mahmood and Puttini 2013).

Broad Network Access*:* Access to cloud resources must be given over the network for the large or small clients heterogeneously. For instance, using mobiles phones, laptops and smart phones are interesting examples from daily life (Plummer et al., 2009). (Erl, Mahmood and Puttini 2013).

On Demand Self-Service*:* 'Automatic provisioning of the computing resources as needed' is another important characteristic (Plummer et al., 2009). (Erl, Mahmood and Puttini 2013).

The Measured Service: This allows 'monitoring, control and reporting of usage'. It also allows for the transportation between the provider and the client (Plummer et al., 2009). (Erl, Mahmood and Puttini 2013). (Erl, Mahmood and Puttini 2013).

Resource Pooling*:* Resources with vendors can be pooled and served using the multi-tenant model which serves multiple clients simultaneously and the various virtual and physical resources are distributed dynamically and the pooling and provision of resources is made according to the demand and need of the consumers (Plummer et al., 2009).(Erl, Mahmood and Puttini 2013).

The resources include storage, memory and computation capabilities etc. Some other allied characteristics associated with the essential ones, are also available in certain categories of cloud computing characteristics (GNi, 2009; Grance, 2010; Vouk, 2008). Such characteristics include resilient computing, using virtualisation, massive scale "availability of computing and storage capabilities, homogeneity, the pay-as you go model and the geographical distribution of clouds, low or no up-front cost for the IT infrastructure and low overhead costs for administration personnel". (Stieninger & Nedbal, 2014).

2.5 Technological perspective on cloud computing

In this section the review of cloud computing is referenced from a technological point of view. Stakeholder's definitions of cloud computing are varied, in accordance with their own individual perspectives. However, it is commonly felt that specifically, it is the improvements to virtualisation that have contributed towards the development of this field. There are a number of sister technologies related to virtualisation, such as grid computing, parallel computing, service oriented architecture and utility computing (Luis et al., 2008; Mell & Grance, 2009b) Hence, it can be concluded that cloud computing is comprised of a number of contributing computing technologies.

The major tools which strengthen cloud computing are service oriented architecture (SOA), grid computing, virtualisation, the Internet autonomic system computing, web application frameworks, web services and open source software. There are also other models designed to assist businesses that support cloud computing which are major contributors. These include Web 2.0, Software as a Service, service level agreements, utility computing, data portability and accessibility and open standards (Mell & Grance, 2009b).

The business models and technologies for cloud computing offer capabilities like storage as logical entities through virtualisation and representation of computation (Bhattacharjee, 2009; Vouk, 2008); thereby enabling storage for use the of multiple users or offering the creation of virtual

machines which copy physical machines (Buyya et al., 2008; Wang & Laszewski, 2010). Service oriented architecture (SoA) enables cloud computing to offer web services that can be accessed through Internet and are available in multiple forms and at multiple locations or platforms (Wang & Laszewski, 2010). “The grid computing has an array option of capabilities to share the resources, has the ability to decentralise the resource control and has heterogeneity” (Luis et al., 2008). Cloud computing services being used as web based applications, such as the Web 2.0 provide improved connectivity whilst using cloud computing. It also extends some characteristics, like interaction between various other web applications. This way cloud computing becomes easy and more efficient (Wang & Laszewski, 2010). Through these technologies, cloud computing is strengthened and is a successful technology. This has become possible only through the augmentation of the existing technologies that support cloud computing directly or indirectly, by providing infrastructure and technology to cloud computing. Furthermore, they provide the surveys, research and experiences based upon which cloud computing is going to capitalise and flourish in the business and industry. The next section includes ‘delivery and deployment models’.

2.6 Cloud computing models for delivery and deployment of services

A total of three service models, also known as delivery models, are given for cloud computing. Besides this, there are four deployment models which are prevalent in the market today (CSA, 2009; Mell & Grance, 2009a, 2009b). A brief description of each model is given below.

2.6.1 Cloud computing services - delivery/service models

There are three in total which represent the services of cloud computing, namely; ‘Platform-as-a-Service’ (PaaS), ‘Software as-a-Service’, (SaaS) and ‘Infrastructure as-a-Service’ (IaaS) (CSA, 2009). Usually the organisation outsources all services and rent the remotely accessed services’ in SaaS. By using the Internet, the client is able to use the software or applications via a ‘thin client’ Internet browser (CSA, 2009). However, there a few shortcomings which are associated to this model in that the client doesn’t hold any control or administration rights in respect of the infrastructure of the system (CSA, 2009; Mell & Grance, 2009a). Some of examples of SaaS include ‘Oracle CRM on demand’, ‘Netsuite’ and ‘salesforce.com’ On the other hand, for PaaS, the service provider rents some dedicated resources to a client who in turn can deploy his own applications on cloud using the predefined or permitted tools. This model is pretty advantageous in that the user has partial control of the deployed application (CSA, 2009; Mell & Grance, 2009a). A few examples of PaaS are ‘cloud 9 analytics’ and ‘Google application engine’. The ‘Infrastructure-as-a-Service (IaaS)’ represents the third model for cloud computing which offers dedicated resources that are rented to clients who are unable to then share this with another third party. The customer can use cloud

infrastructure using the provided application or tool. The tools or applications given sometimes come along the operating systems and other work tools. In this model, the customer cannot control the infrastructure yet may control the applications, network components, locations and storage etc. (Mell & Grance, 2009a).

2.6.2 Cloud computing services - deployment models

There are four models which are meant for the deployment of cloud computing services, regardless of which of the delivery model (SaaS, PaaS, or IaaS) is adopted. All these models address the specific needs or situations and hence, are categorised into different derivatives (Dustin Amrhein et al., 2010; CSA, 2009). Namely, 'the basic deployment models' include hybrid clouds, community clouds, private cloud, and public cloud (Dustin Amrhein et al., 2010; Catteddu & Hogben, 2009; CSA, 2009; Grance, 2010; Mell & Grance, 2009a).

2.6.2.1 Public cloud

With this model the cloud infrastructure is accessible to the public as a 'pay as you go' service. All the administrative, sharing, economic and scalability issues are controlled by the service provider. Using this version of cloud, the consumer can opt to negotiate and select the level of security needed. The most common example of this type of offering is the Amazon Web Services EC2. Dustin Amrhein et al. (2010) described the formation of public cloud computing by placing emphasis on the structural components, as shown in Figure 2-2 below.

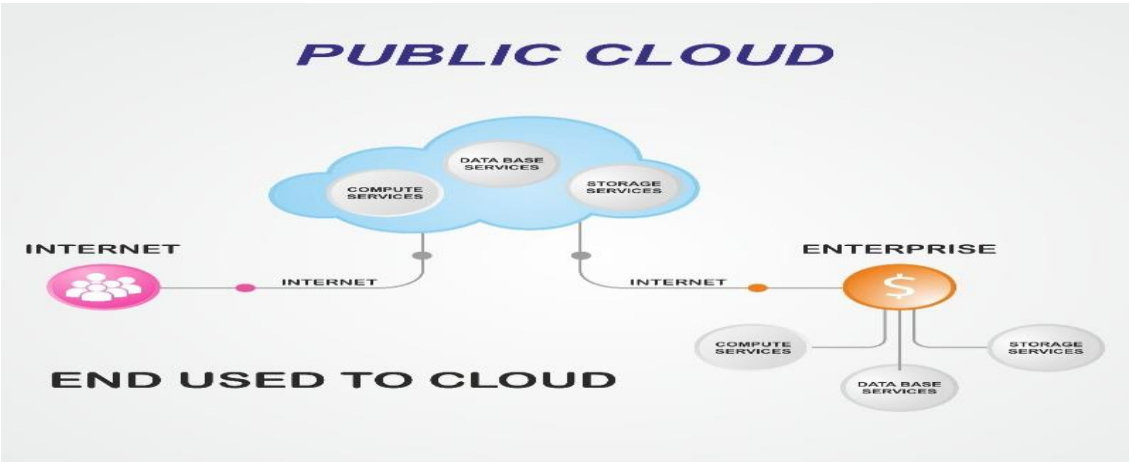

Figure 2-2 Deployment of service model for public cloud computing

2.6.2.2 Private cloud

With the deployment of the private cloud 'the resources are not shared by unknown personnel or organisations' (Subashini, S. and Kavitha, V., 2011). The 'cloud resources' are mostly installed within

an organisation's premises. This is pretty advantageous in that the security of the client, their rights, products, as well as compliance, is not affected. However, a drawback to this form of cloud computing is that capital expenditure is not significantly reduced because in every organisation, an in-situ installation of infrastructure is made separately. Dustin Amrhein et al. (2010) showed the formation of private cloud computing, placing emphasis on the structural components, as shown in Figure 2-3 below.

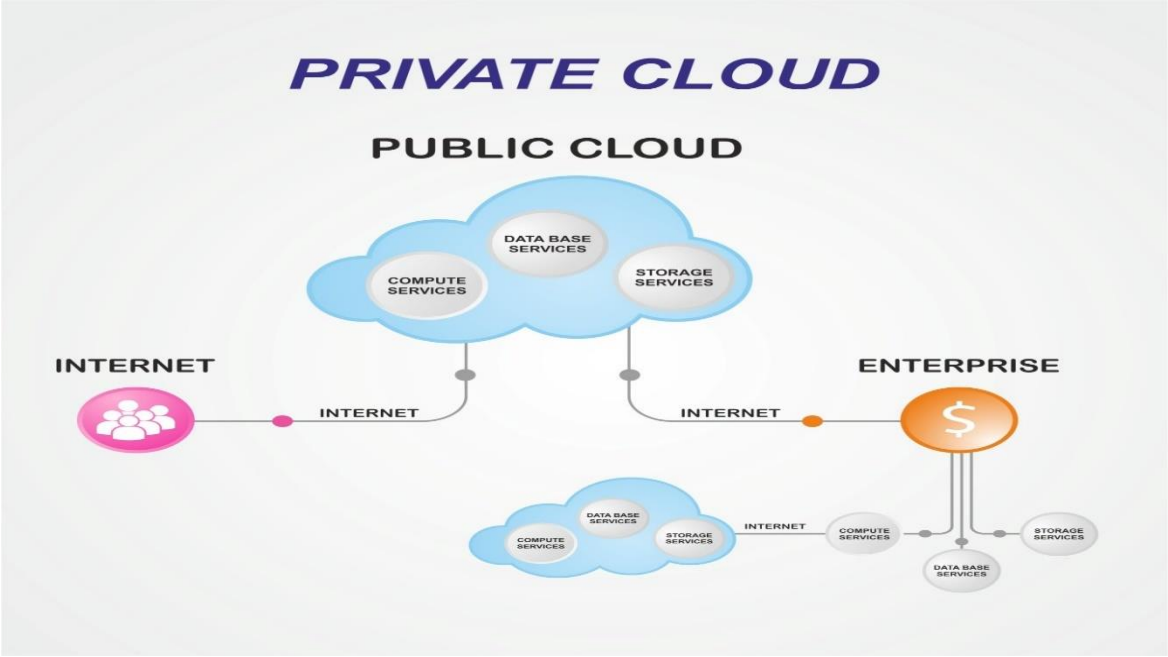

Figure 2-3 Deployment of services model in private cloud computing

2.6.2.3 Hybrid cloud

Hybrid cloud deployment offers a service where one or more different clouds are combined, for example, public and private clouds working together. During the working of this type of computing, the clouds are bound together by standardised technology, though they can also maintain their individual identities separately (CSA, 2009).

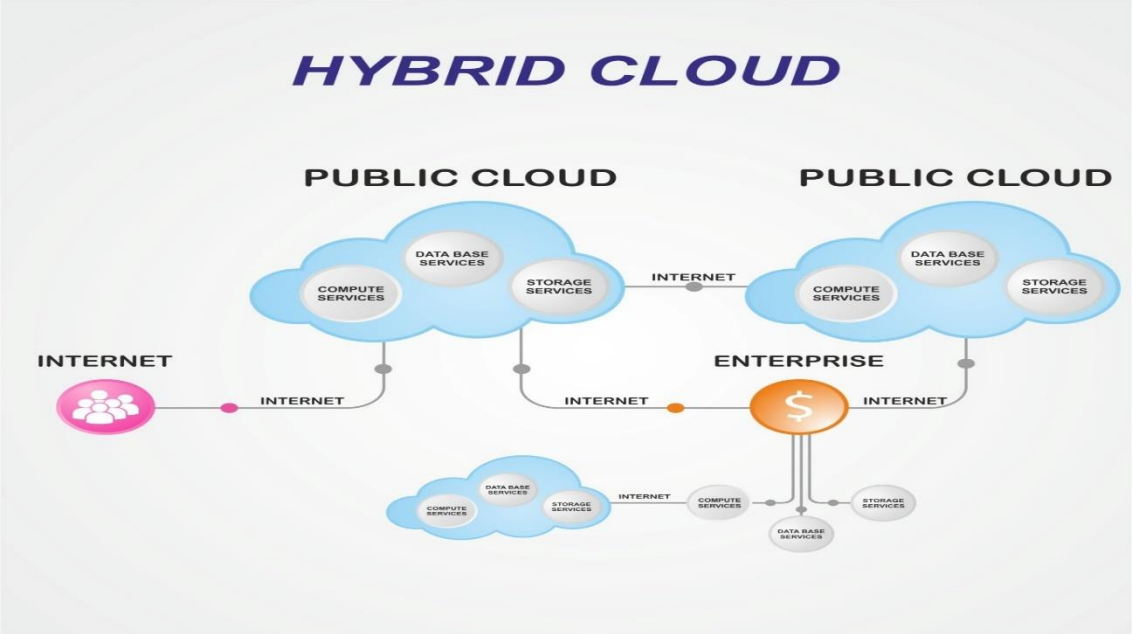

Figure 2-4 Deployment of service models in hybrid cloud computing

Dustin Amrhein et al. (2010), as demonstrated in Figure 2-4, illustrated the formation of hybrid cloud computing, placing emphasis on the structural components.

2.6.2.4 Community cloud

The community cloud can also be used to provide computing related services. Using this deployment method, many organisations can work under one infrastructure and administration. Like minded and similar task oriented organisations can take advantage of such deployment and minimise their security requirements and other compliance considerations. Such computing can be operated by third parties and may or may not be located in-situ nor off site. (Dustin Amrhein et al. 2010)

2.7 Benefits of implementing cloud computing

Cloud computing, along with various delivery models and deployment clouds, offer remuneration benefits to the business community in general and businesses as a whole (Andrei, 2009; Catteddu & Hogben, 2009). The major benefits associated with cloud computing include low maintenance costs, low administrative costs and economies of scale arising from the reduced cost of the IT infrastructure. Other benefits include improved performance through scalable computing, and unlimited storage and memory capabilities. Further, the efficiency of the computing system, low cost to undertake security measures, quick incident response and easier data monitoring are also important factors.

There are, of course, a number of disadvantages which are associated with cloud computing including the requirement of a sustainable Internet connection, work or traffic based speed of the Internet – this can cause additional expenditure such as paying extra wages to employees, limited features, security vulnerability and compromised situations, risk of loss of data and risk to business and risk of cloud operator bankruptcy (Jeffrey & Neidecker-Lutz, 2009; Miller, 2008; Ristenpart et al., 2009).

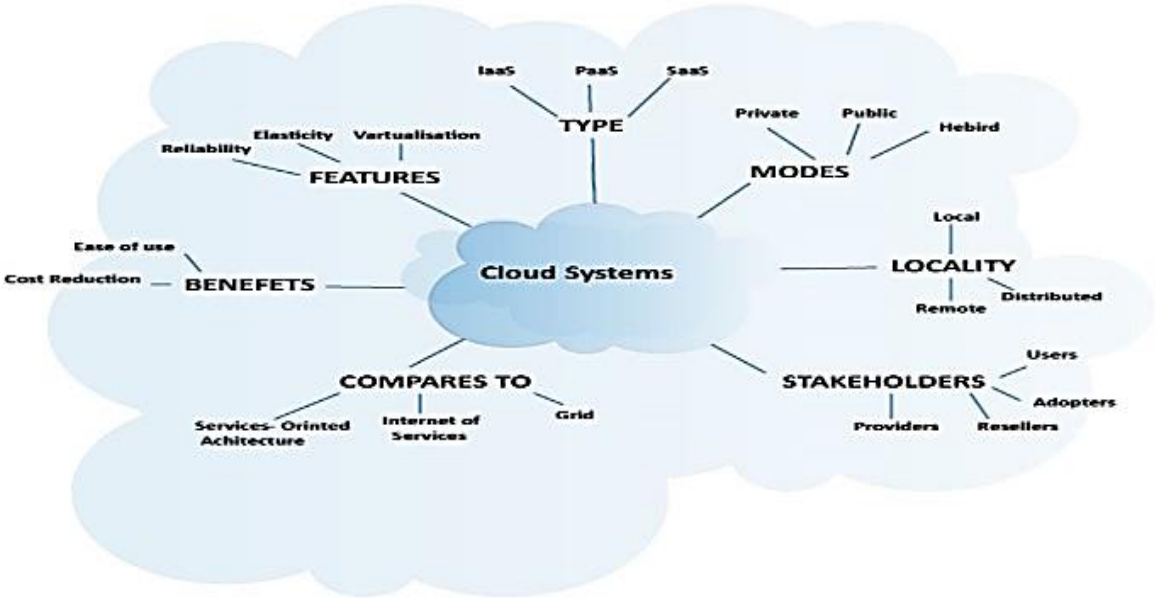

Figure 2-5 the summarised view of cloud systems (Zhou, Z. and Huang, D)

Figure 2-5 shows the summarised view of cloud computing with respect to its types, benefits, modes, locality and features.

According to the CSA report in 2009, the presence of the risks and challenges associated with the applications of cloud computing cannot be eliminated without first having a detailed level of knowledge and understanding about them. Thus, understanding the relationships and dependencies between the three delivery models (IaaS, PaaS and SaaS) is critical (CSA, 2009). This relationship mainly involves the building of cloud computing applications by stacking different applications on top of each other. For instance, in order to build the application – IaaS, PaaS and SaaS – the PaaS is constructed on top of IaaS which serves as building foundation, while SaaS is placed over top of PaaS. In this way, the layers build upon each other and each layer inherits the weaknesses, strengths, risks and issues of the layer on which it is built (CSA, 2009).

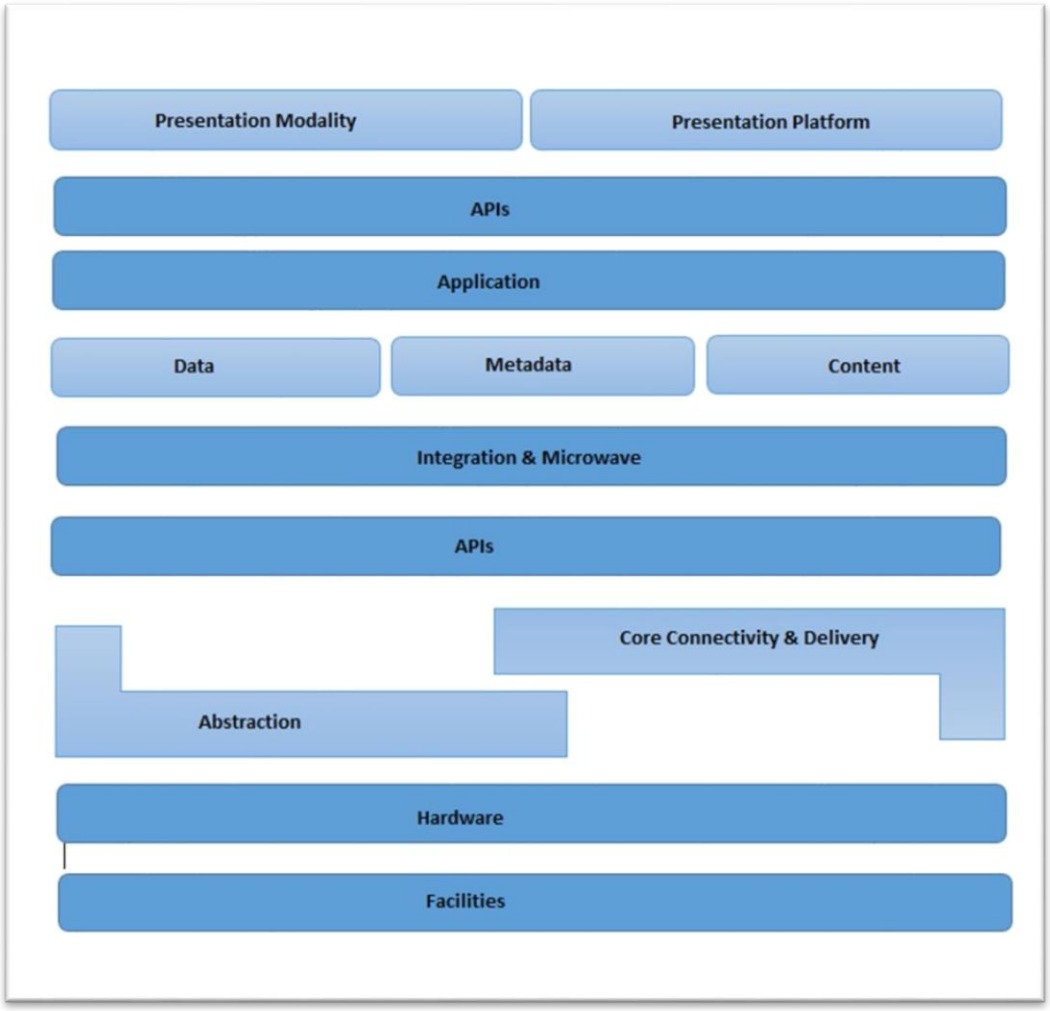

Figure 2-6 Cloud computing reference model(CSA, 2009)

Figure 2-6 indicate that dependencies and relationships of these layers can be best illustrated (CSA, 2009)

2.8 Status of Cloud adoption in the developed and developing Countries

Alsharo (2017) states that Cloud Computing offers a new and unique opportunity in developing countries to accelerate the process, bringing with it the promise of bridging the digital divide, meaning Internet access to applications Platform as a Service, Software as a Service, or infrastructure as a service resource. Cloud computing is undeniably a major development for companies, administrations, and individuals in developing countries. However, the numerous advantages of Cloud Computing in developing countries are: mutualization of equipment, thus optimization of costs, lightness, and flexibility of a structure available without geographical limit, and tolerance to breakdowns -- in short, a fleet of shared and flexible infrastructures, simple to set up, without technological dependence or commitment, causing only low running costs and further rationalizing energy consumption. The challenge of this new ecosystem is probably even greater for

developing countries. Indeed, the cloud should redistribute the cards and allow access for the least-developed countries, or develop advanced technologies that have hitherto been reserved for developed countries (Alsharo, 2017).

2.9 Evaluation of the Need for the Adoption of Cloud Computing

Cloud computing is based on the idea of using computer services without the need for all programs and files used to be stored on the PC. The advantages of choosing SaaS, or software as a service, for business dynamics and its benefits for the development of the company are evident, both economically and in terms of productivity. A good account of it gives users platforms like Open2Saas (Rahimli, 2013).

However, payment for use frees users of large investments in both software and hardware, because the price of programs and applications becomes cheaper with the possibility of being shared by many users, and it is not necessary to buy powerful computers or invest in technical maintenance, which increases the profit margin.

On the other hand, the software is located in one place, which can be accessed from any site with an Internet connection, the provider is responsible for updating it for users, and its scalability is guaranteed as well, since this includes covering new needs of the service and the clientele; in addition, it converts the internationalization process into something much faster and easier. All this, in short, optimizes resources and sharpens flexibility in company procedures (Rahimli, 2013).

In this way, those businesses or professional activities that utilise the Internet, whether through the dissemination of content or sales, should ask cloud business solution providers to access the system with a click, without complications or downloads, in a way that is configurable and ensures its full availability, regular backups to avoid losing information, a fixed monthly price and, of course, automatic scalability (Rahimli, 2013).

2.10 Adoption status of Cloud computing in Saudi Arabia

Since the middle of last year, many companies in Saudi Arabia have begun to make the choice to adopt technologies of cloud computing that would offer them much more than their traditional technologies. However, this step should be studied in depth so that they do not dare to sacrifice their e-security. Half of the companies in Saudi Arabia are rushing to adopt cloud technologies without taking into account the security risks surrounding them (Ghazzawi, 2017). However, the adoption of cloud computing technologies in Saudi Arabia is critical to achieving the vision of Saudi Arabia 2030. People in Saudi Arabia are seeing increasing interest from the government in

technology solutions and increasing demand for new technologies. The demand for cloud technologies is driven by the desire to achieve more rapid and innovative digital processes of electronic security to achieve progress and development. Therefore, Saudi Arabia needs to consider all potential risks in the adoption of Cloud Computing technologies.

2.11 Framework of Technological-Organisation-Environment (TOE)

This framework was designed by Tornatzky and Fleischer (1990) in order to understand the factors affecting the adoption of the innovative and advanced technologies at the organisational level. According to this model, when the management of the organisation tries to implement new technologies to innovate the processes and products, there are multiple factors originating from the organisational, technological and the environmental contexts which can play a key role in encouraging or discouraging the adoption of technologies (Figure 2-7).

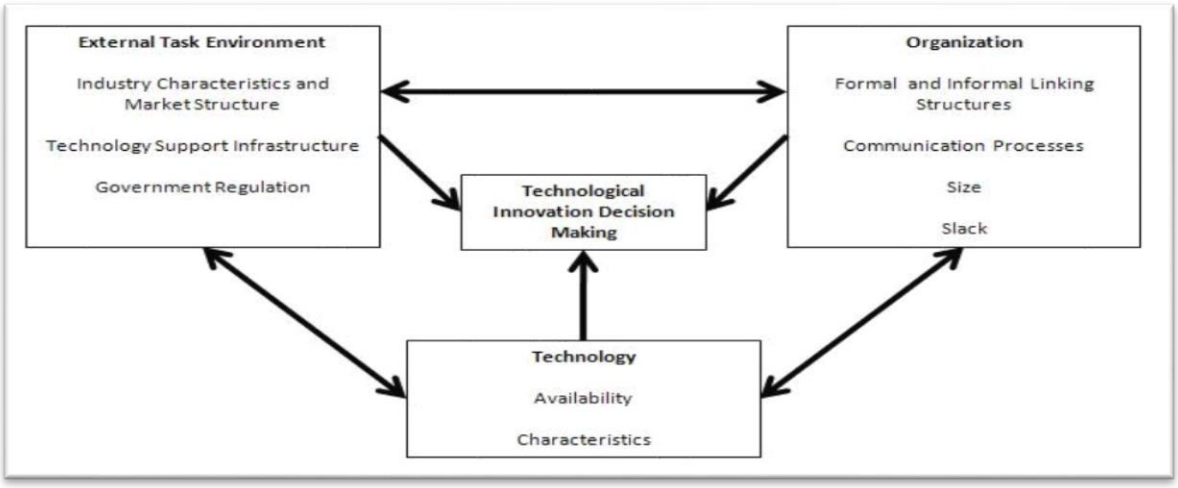

Figure 2-7: Diagram/schematic of TOE framework

Figure 2-7 indicates that framework, in which the technological context relates to the technologies available to an organization. Its main focus is how technology characteristics themselves can influence the adoption process (DePietro et al., 1990).

In the following paragraphs, the description of environmental context, technological and organisational contexts will be provided.

2.11.1 Environmental context

The environment of the organisation represents the stakeholders, competitors, consumers, governmental agencies, community and suppliers etc. These factors determine the needs for new technologies and innovations for the organisation and identify the available resources which can

be potentially used to introduce and implement the new technologies (Low et al., 2011). The foregoing factors can either encourage or discourage the adoption of the technologies necessary for the innovation and development of the organisation. The ever-evolving consumers' needs, the market structure and competitive landscape encourage the organisations into using the various technological innovations (Yee-Loong Chong & Ooi, 2008). Government regulation is another important factor which can either block or help propagate technological innovations. The physical location (hosting the data management applications such as cloud computing) of new technologies is another important aspect which determines whether the consumers of the organisation would support the implementation of new technologies (Xu et al., 2004).

2.11.2 Organisational context

Organisational factors affecting the technological adoption include the behaviour of leadership, the decision making power of management, leadership controls and links of the organisation within and outside of the organisation. The modes of communication prevalent and the dependencies of the organisation on these modes also play a fundamental role in increasing the adoption of technological applications and innovations (Wang et al., 2010). The new technologies help the organisation to forge better communication channels within the organisation and strengthen the inter-organisational linkages; therefore, the organisations are more dependent on the innovative methods and applications to enhance communication (Oliveira & Martins, 2011). For the effective introduction of new technologies it is paramount that the leadership of the organisation understands the importance of the technological innovation and is willing to implement it (Ibid). For that purpose, the human resource management (HRM) department of the organisation and top executives must collaborate in their efforts to change the attitudes of employees and consumers and prepare them for the new technologies being introduced, in order to increase the performance and productivity of both the staff and the organisation as a whole. Consequently, the managers of the organisation require change management expertise, otherwise the implementation of the technologies cannot be made (Pan & Jang, 2008).

2.11.3 Technological context

Tornatzky and Fleischer (1990) described the influence of technology within the 'systems design perspective' which involves the system's life cycle, technical expertise, socio-centric and techno-centric approaches of the organisation. The techno-centric approach requires the organisation to understand the importance of the technologies in overhauling their systems and the innovations of their processes and products (Hameed et al., 2012). The experience of the organisation in importing and implementing the new technologies matters a great deal in this

context, along with the expertise of effectively engineering and installing the new systems (Ibid). However, the socio-centric approach is related to the construction and redesign of the organisational systems, modifying the HR policies to accommodate the new technological ideas, redesigning the jobs and successfully installing and integrating the technological innovations. The presence of technological sustainability and its continuous use is also important for the continuous use of the newly integrated technologies within the organisation (Baker, 2012).

As this framework considers the influence of the organisational, technological and environmental factors, it has the flexibility to fulfil the criterion of inclusion of all possible factors to determine the feasibility of technological adoption at the organisational level (Oliveira & Martins, 2011). Despite the advantages of the TOE framework for the adoption of the technological innovations for the organisations, the applications of this model should be considered carefully while applying differing social perspectives in different countries. In almost every society there are norms and values which can affect the organisational structure, management styles, modes of change management mechanisms, the technological expertise and experience of using the new technologies. Therefore, this framework may involve differing factors in different countries based upon their socio-centric, techno-centric and conflict management approaches (Xu et al., 2004). For example, in the context of the current project, the typical socio-cultural and management structure of Saudi Government agencies need to be taken into account while applying this technological framework.

2.12 Security, legal and compliance issues

As described previously, the challenges related to compliance, legal and security will greatly affect the level of trust which is established between a customer and the provider. In this chapter, various issues associated with cloud computing in relation to compliance, trust and other legal domains will be discussed in detail. Furthermore, how a breakdown of how these challenges impact the implementation process, coupled with a number of suggestions to help eliminate these barriers, will also be discussed. The main concerns within the organisation relating to security and other issues are also discussed. The compliance and legal aspects are highlighted, particularly those related to the protection and sharing of data, along with their proposed solutions.

2.12.1 Trust

Trust is 'The subjective probability by which individual A, expects that individual B will perform a given action on which its welfare depends" (Gambetta, 2000). It depends on the acceptance level of what eventually determines how much one can adapt the application of cloud computing. To adopt cloud computing to the fullest of one's freedom and trust, various situations have to be

addressed where there are requirements to establish trust. A total of five such situations have been identified to establish the trust of the client. The most important element for the trust is 'access' to resources by or of the client (Grandison & Sloman, 2000). During this case the resources are either under the accountability of trusting part or they are owned by the same (Pearson, S., 2013). Abrams and Joyce (1995) described the scenario that trustor hands over his resources to the trustee to execute or apply which, in this case, is cloud computing.

In another situation, the stipulation of service by the trustee (Grandison & Sloman, 2000), and the provision trust, as defined by Grandison and Sloman (2000), are considered as 'service provision'. Another scenario is business trust (Boeyen et al., 2003), where the service provider is given complete access and therefore trusts the service provider.

Other examples include authentication trust (Boeyen et al., 2003), identity trust (Pearson, S., 2013) and certification of trustees, all of which are important scenarios which should be addressed by cloud computing. This ensures that the client is going to trust a genuine service provider. Additionally, in a situation where the client trusts a service provider to directly provide them with full access to his resources; this is called delegation trust. Conversely, the service provider makes the decision to use the resources of the client (Grandison & Sloman, 2000). In the case of this form of computing technology there is often the possibility that the service provider may conduct the e-discovery and security audit for all the resources of the client. This type of trust comes under a 'trust decision-making service' (Grandison & Sloman, 2000). Lastly, infrastructure trust is another vital component to be addressed. During this scenario, a limit is defined with the agreement of the trusting party. If the institutions place and order and require the systems to be made available on site then, they stand the responsibility of providing the safety net (Pearson, S., 2013).

2.12.2 Security

Schneier (2008) explained that "Security is both a feeling and a reality - and they are not the same." and the probability of any kind of risk occurring defines the type and intensity of the security needed. Further, the alleviations policies to cope with the possible risks greatly influence the security concerns. The countermeasures to deal with the risks are also indirectly or directly treated as a psychological feeling. Hence, cloud computing needs to address the feelings and psychology of the consumers directly by dealing with the risks to ensure their clients feel safe. This way the customers will trust the service providers of cloud computing.

Compliance and security together can be mapped according to the cloud security alliance where gaps between the security control model, organisation compliance model and cloud model are identified. Once the requirement for compliance is identified, and a suitable place is identified out

for the security model application, the company can then join the cloud infrastructure with the most appropriate security controls.

2.12.3 Major security challenges

Undoubtedly it is not easy to secure and ensure the safety of linked computers because a series of computers and clients are involved; this is known as multi-tenancy. The cloud service providers and cloud computing have to face many challenges, particularly in the area of security issues. Thus, it is very important to consider how these challenges are mimicked and how security models are implemented in order to ensure the security of clients and establish a safe cloud computing environment. The major challenges involved are:

2.12.3.1 Lack of appropriate governance

During cloud computing the services provider has full control. By passing this control to the provider there is a danger that the loss of control over authority parameters could possibly result in security being compromised, problems arising in terms of data access and the application of the resources. This compromised security concern comes with another threat of creating a gap in security cover in cases where SLAs are not in place with the service provider. Further, the terms of use are also open to the liberty of user meaning that access to data can be exploited quite easily. For instance, the Google search engine states that the user: "*agrees that Google has no responsibility or liability for deletion or failure to store any content and other communication maintained or transmitted through use of the service" (Google, 2010).*

Amazon also clearly state that they don't take any responsibility, liability or authority for unauthorised use, corruption, access, loss or deletion of data, or any other sort of access including harm to the application (Amazon, 2010). Hence, customers are faced with security concerns regarding their data and application, as hosted by the third party, service provider or mediator.

2.12.3.2 Lock-in

Another hurdle is inadequate standards of data format, a lack of operating methods and shortage of tools which collectively cause a compromised portability between the services and application, even between service providers. Consequently, the customer has to be dependent wholly and solely on the vendor (Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. and Ghalsasi, A., 2011).

2.12.3.3 Isolation failure

The sharing of resources owing to multi-tenancy of cloud computing is itself a questionable characteristic. The shortage of separate storage can be deadly to businesses. Other concerns

involving guest hopping attacks and their aggravation are considered to be a great hurdle in the use and implementation of cloud computing applications (Ransome et al., 2009).

2.12.3.4 Malicious attacks from management internally

Sometimes the architecture of cloud computing environments poses certain risks to the privacy and security of the customers (Gupta & Kumar, 2015). Although it happens rarely, this risk is very difficult to deal with. Suitable examples include the administrators and managers of cloud service providers who can sometimes act as malicious agents and threaten the security of the clients using cloud computing applications.

2.12.3.5 Insecure or incomplete data deletion

In instances where clients request deletion of their data either partially or completely, this raises the question of whether it will be possible to delete the desired part of their data segment with certainty. This makes it harder for the clients to subscribe to the services of the cloud-computing (Wang et al., 2011).

2.12.3.6 Data interception

Unlike with tradition computing, the data in cloud computing is segmented and distributed in transit. This poses more threats due to the vulnerability and fragility of the computing technology and, in particular, sniffing and spoofing, third party attacks and reply attacks (Zissis, D. and Lekkas, D., 2012).

2.12.3.7 Compromise of management interface

Since the services of cloud computing are delivered remotely over the Internet and the resources are accessible to the service provider, third party access can result in malicious activities (Jensen & Schwenk, 2009). As a result, the vulnerabilities, manipulation of services and involvement of the service provider are amplified. For instance, the customer may take over the machines and conversely the provider can take over the control by setting up no-go zones in the applications of cloud computing.

Other challenges related to security include the transfer of information within different applications of cloud computing, leakage of information while uploading data to cloud, attacks on privacy and security of user's data, loss or malicious manipulation of encryption keys and conflicts between service providers and customers on procedure and policies on the operation of cloud computing applications (CSA, 2009, 2010; Hogben & Catteddu, 2009; Ristenpart et al., 2009).

There are also challenges that indirectly interact with or influence cloud computing but have no direct impact upon the integrity of cloud computing applications. Such scenarios include: modification of network traffic, network breaks and administrative issues, such as non-optimal use of resources, congestion and miss-connection. There are some other risks associated to the applications of cloud computing, for instance, the risk of social engineering attacks, natural disasters and theft of equipment (Catteddu & Hogben, 2009).

2.12.3.8 Vulnerabilities and threats

An arena of fragile computing technology with vulnerable environment provides and the possibility of more attacks. The most likely threats and vulnerabilities relating to cloud computing, as proposed by Catteddu and Hogben (2009), are:

- Virtual machine based rootkit as an example of Hypervisor vulnerabilities.
- Customer centred control of the service which is known as 'user provisioning and de-provisioning'.
- Lack of standard technologies and solutions.
- The management of cloud interfaces while providing remote access to users.
- The weaknesses in design of encryption keys such as easy manipulation of keys by malicious users.
- The limitations inherent in the developmental stage of authentication, accounting systems and authorisation.
- Potential occurrence of co-residency checks.
- Network probing possibility from the internal sources within the cloud.
- Misconfiguration.
- Lack of forensic readiness and sanitisation of sensitive data.
- Inaccurate modelling of resource allocation and a lack of control in vulnerability assessment processes.
- Conflicts in policies and agreements of cloud service providers and the conflicting promises of service providers to clients and other stakeholders.
- Lack of audit or certification on the part of the cloud service provider.

Such a large number of associated issues shows the significance of the security concerns associated with building trust with cloud computing. The most important threats, as identified by Cloud Security Alliance (CSA, 2010), are related to account or service hijacking, shared technology issues, malicious insider attacks, unknown risk profile, data loss or leakage, abuse and nefarious use of cloud computing and insecure interfaces and application programming interfaces (API).

The above list of threats/risks is not exhaustive yet they represent more or less all of the threats which are likely to happen in the technology. Nevertheless, they emphasise the need for establishing the security measures and the concerns of the customers. Without establishing the security risk, addressing the associated risks and making plans to minimise the issues, the trust of the customers and establishment of cloud environment cannot be attained.

2.12.3.9 Source of perceived security threats

Fears increase with the customers/clients as the vulnerabilities rise, along with the other risks associated with the use of cloud computing. Once the security challenges are compromised, a feeling of distrust is established with the customers and hence this can result in the adoption of cloud computing being slowed down, unused or even rejected in the worst cases. This section presents a brief discussion on trepidation arising from various sources in relation to these possible threats (Armbrust et al., 2009; Catteddu & Hogben, 2009; CSA, 2009).

Confidentiality is an important aspect of cloud computing as it does highlight the sensitivity of the secrets and related data over cloud computing applications. The important question is related to whether or not cloud computing would leak out the confidential data of its clients. All such fears are directly linked with the fear of loss of control over data presented in cloud computing applications. Overall, this situation requires the security management of cloud computing to consider the seriousness of the risks related to confidentiality of data and this can appeal to the feelings of clients regarding the sensitivity of this data (Zissis, D. and Lekkas, D., 2012).

Integrity is to assure the customer that the vendor providing them with cloud computing services is a genuine person and has taken the necessary measures to secure their data. Furthermore, integrity is also related to the assurance that customer receives that their data are not tampered with, nor will it be passed on to a third party for any purpose as part of the agreement between the service provider and the customer. This integrity mechanism provides satisfaction and peace of mind by putting in place transparent business policies and rules (Krutz et al., 2010).

Availability refers to the recovery of sensitive data in the case of bankruptcy, the attack to the services provided by the vendor or change of management policies and regulations relating to data traffic flow. These issues require the vendors to put in place the mechanism of data recovery in the

event of a disastrous situation and to maintain the business continuity of customers (Andert et al., 2002; Chow et al., 2009).

Privacy relates to the data mining of the client's data and the assurance that this will remain private. Google mail or Gmail are good examples of this (Andert et al., 2002; Chow et al., 2009).

Increased attack surface deals with the management of cloud computing to either block or respond to phishing attacks. The communication links can also be the victim if cloud computing applications are compromised as a result of external attacks where 'hackers' attempt to steal data (Rosado et al., 2013).

Legal quagmire and transitive trust is the area of importance which highlights the responsibility for compliance and whether the service provider or the client will take on this responsibility (Andert et al., 2002; Chow et al., 2009).

Table 2-1: Key previous studies examining the determinants of Cloud Computing adoption

Source	Study Level	Methodology	Variables	Key Findings
Low et al. (2011)	Organisation	A questionnaire-based survey	• Relative advantage • Top management support • Firm size • Competitive pressure	The study found that relative advantage, firm size, competitive pressure, top management support, and trading partner pressure have a significant effect on the adoption of cloud computing.
Alshamaila et al. (2013)	Organisation	Qualitative exploratory study	• Relative advantage • Uncertainty • Geo-restriction • Compatibility • Trialability • Size • Top management	The factors that are identified as playing a significant role in adoption of cloud services are: relative advantage, geo-restriction, compatibility, trialability, top management support, size, prior experience, innovativeness, industry, supplier efforts, market scope and external computing support.
Oliveria et al. (2014)	Organisation	Quantitative	• Compatibility • Trialability • Organisation size • Top management support • Environment	This study developed research model from DOI theory and the TOE framework to identify the determinants that influence the adoption of cloud computing. The study found DOI and TOE variables are the key determinants of cloud-computing adoption in the manufacturing and services sectors.
Lin and Chen (2012)	IT Professionals	Survey	• Compatibility • Company Policy • Environment • Business Need • Relative Advantages	This study aims to investigate how cloud computing is understood by IT professionals. The findings of the study suggest that IT managers and software engineers have are compatibility of the cloud with companies' policy, IS development environment, and business needs.
Saya et al. (2010)	IT Professionals	Survey	• Institutional influences • Accessibility, • Scalability • Security	Building on the institutional perspective and real options theory, this study examines how institutional influences may affect organisations' perceptions about the technological characteristics of cloud computing and recognition of real options.
Shimba (2010)	Organisation	Qualitative	• Organisational Factors • Environment	This research project aims at developing a roadmap called ROCCA (Roadmap for Cloud Computing Adoption), which provides organisations with a number of steps for adopting cloud computing and building trust. It presents in detail the technological factors key

Source	Study Level	Methodology	Variables	Key Findings
				to a successful cloud computing adoption, and it introduces the technology underlying cloud computing.
Hsu et al. (2014)	Organisation	Quantitative	• Perceived benefits • Business concerns • IT capability	This study uses the TOE framework of innovation diffusion theory to develop a cloud service adoption model. This study found that Cloud adoption is still at its initial stage, since the adoption rates are very low. The perceived benefits, business concerns, and IT capability within the TOE framework are significant determinants of cloud computing adoption.
Borgman et al. (2013)	Organisation	Quantitative Study	• Organisational • Technological • Environmental	This study builds on Tornatzky et al.'s TOE frame-work to investigate the factors influencing cloud computing adoption. The results indicate that the technology and organisation context affect implementation decisions.
Albalawi (2014)	Organisation	Quantitative Study	• Speed of the system • Workflow • Technical perspectives • Administrative perspective • Logistic perspective	The study found that SAFEER e-service is effective tool to serve students. Nevertheless, it needs more improvement and adjustment to accommodate users' needs and requirements. The usability of the system is very low; more changes and options are required to make the system more effective and efficient.
Branco, et al.(2017)	Organisation	Interviews	• SaaS services • Business Maturity • Trust in Provider • CC Advantages • Risk Analysis • Service level agreements	Difficulties in the adoption of Cloud Computing technologies. Risks and solution to overcome obstacles. Reporting the experienced circumstances.

Table 2-1 indicates previous studies that have examined the determinants of Cloud Computing adoption with different methodologies and different variables.

2.13 Summary

There is no doubt that all of the aforementioned fears, threats and challenges are based upon classical computing and existing environments, however, the customers must have feelings of safety and trust with their service provider. The underlying issues and concerns stated above require the vendors and service providers of cloud computing to install the necessary reliable and comprehensive security measures to protect the customers' data on cloud computing. Furthermore, these issues may vary from country to country based on their cultural values which are source of trust and reliability in their own right (Zissis, D. and Lekkas, D., 2012).

Therefore, there is a need to study the issues and variations in the level of threats in different countries with different culturees to pinpoint the main issues and threats which are the source of great hurdles in the way of use and implementation of cloud computing. This study intends to analyse the various issues and threats to cloud computing services which may be a great hurdle in the use of cloud computing applications. The next chapter will develop the framework of factors based on the issues and challenges which Saudi Government agencies overseas can face in the development and implementation of cloud computing applications.

Chapter 3 Theoretical Framework

This chapter outlines the theoretical framework of the study which is appropriate to analyse the adoption of cloud computing technology by Saudi government ovearseas agencies. The framework builds on previous research on technology adoption, as set out in the literature above. The theoretical framework takes into account factors relating to organisational settings and cultural set-ups which previously available models of technology adoption neglect and which are particularly salient in the context of the present study. More specifically, the main factors that the framework takes into account are organisational factors, including the culture and vision of the organisation, technology factors and environmental factors which include the prevailing cultural conditions, legislation and policy concerns. All of these factors are particularly relevant to the Saudi government agencies overseas and their decisions whether to adopt cloud computing.

3.1 Theoretical framework

The framework of technology-organisation-environment describes the organisational adoption and procedure of decision making which elaborates broadly on the ideas of organisational context (Barker, 2012; Pan & Jang, 2008). This framework, however, only provides the contexts of organisational decision making and the classification of the main drivers affecting the decision-making process of adopting information systems; consequently, this model cannot be taken as a separate model representing the determinants for the adoption of information systems at an organisational level (Bosch-Rekveldt et al., 2011; Gibbs & Kraemer, 2004).

Also, this framework formulates the categories of new IT based technologies involving the factors which can assist or hamper the use of information systems within organisations, based on their environmental or technological contexts. The TOE framework has been employed by several researchers for assessing the adoption potential of various IS technologies (Zhu et al., 2004; Zhu & Kraemer, 2005), Internet (Mishra et al., 2007) and open systems (Chau & Tam, 1997). For these reasons the TOE model is highly appropriate for this study in order to investigate the factors affecting the adoption of cloud computing for Saudi Government agencies overseas. In addition, the categorisation of factors which can affect the adoption of cloud computing is useful for this study as multiple factors can be involved in making the decision to use cloud computing applications in Saudi government agencies (Lacovou et al., 1995).

The various components of the TOE framework include practical feasibility, strong theoretical structure and scenarios for IS implementation (Oliveira & Martins, 2011). Within the TOE framework a significant component is the environmental sub-framework which augments the capacity of the model in its own right, to promote the implementation of the technological

innovations within the corporation. These attributes of the TOE model make it comprehensive and suitable for this study.

A literature survey on the various models which are used for IS adoption and implementation demonstrated that researchers have applied the TOE framework (Mishra et al., 2007; Zhu et al., 2004; Zhu & Kraemer, 2005). This indicated the potential of this model to provide the strong empirical evidence regarding the factors affecting the adoption of IS at the organisational level.

The empirical outcomes of Lacovou et al. (1995) showed the implementation of TOE with extended factors within different cultural environments. This shows the potential of this model to undergo the modifications based on the cultural and environmental factors to study the adoption of IS technologies in a specific organisation. The study also comprised the analysis to describe that any other similar framework can show different outcomes if employed in a particular environment. Therefore, this research has chosen the model developed by Lacovou et al. (1995) and the TOE framework in order to have deep insight into the factors affecting the adoption of cloud computing by Saudi government agencies. The present study focuses on the factors which can potentially play a pivotal role in the adoption of cloud computing at the organisational level. Cloud computing and the main drivers behind its adoption are subject to assessment in this study by taking into account the various contextual and theoretical factors given in the chosen model.

The hypotheses and research model, as inferred from the literature, incorporates several hypotheses consisting of the critical factors , these are important factors that are central to the development of information systems for agencies overseas, in respect of the adoption of cloud computing within an organisation and how they are developed and this will be tested in this study. These hypotheses have been developed based on the environmental, technological and organisational contexts of Saudi government agencies. Hence, the technology, the critical factors and predictors for the adoption of the IS technology are considered to be established factors in the field of adopting IS tools. The proposed model also illustrates the relationship between dependent and independent variables.

In recent years, researchers in a number of fields have devoted increasing amounts of attention to the subject of technology acceptance. Information systems acceptance alone has been addressed by an abundance of sociological and social-psychological theories and models. As Schwarz and Chin (2007) explain, there are many competing models of information technology acceptance, each with a different set of acceptance determinants.

The following enumeration of some of the better-established and commonly used theoretical models illustrates the diversity of approaches that currently obtains: the theory of reasoned action or 'TRA', as discussed in Fishbein and Ajzen (1975) and Ajzen and Fishbein (1980); the theory of

planned behaviour or 'TPB' (Ajzen, 1985); the technology acceptance model or 'TAM' (Davis, 1989); the 'TOE' framework (Tornatzky & Fleischer, 1990); the motivational model or 'MM' (Davis et al., 1992); the model of PC utilisation or 'MPCU' (Thompson et al., 1991); the innovation diffusion theory or 'IDT' (Moore & Benbasat, 1991).

Sukkar and Hasan (2005) describes how some of these models of technology assessment were developed, explains how they have been tested, and reports how they have proven to describe the adoption of a broad spectrum of IT systems effectively including internet banking, e-commerce, e-government, m-government, mobile banking, email and e-learning, as well as cloud computing, which is the focus of the present study.

3.2 Hypotheses development

The hypotheses formulated for this study are presented here and are expressed as statements that reflect critical success factors. These hypotheses are designed to achieve the aims of the study which include investigating the factors, including organisational, technical, environmental and cultural pressures, which influence the adoption of cloud computing.

The process of developing the conceptual framework entailed a thorough literature review to identify the key variables used in this subject area (see Table 2-1). This was followed by isolating the most important variables that influence cloud adoption within the context of KSA. This therefore required the review of literature of studies done in the KSA and the Gulf States. Finally, hypotheses were formed about the relationships amongst the variables.

3.2.1 Organisational factors

The following are the organisational factors (sources can be found in Table 3-1).

1- Employee readiness
2- Management Support
3- Culture of Saudi Government
4- Vision of the organisation
5- Change Management competencies
6- Cost of infrastructure

3.2.2 Technological factors

The following are the technological factors (sources can be found in Table 3-3).

1- Users’ trust

2- Service quality

3- Usefulness of the system

4- Data security

5- Privacy

6- Lack of IT standards

3.2.3 Environmental factors

The following are the environmental factors (sources can be found in Table 3-2).

1- Legislation and policy concerns
2- Government intervention
3- KSA culture

Table 3-1: Organisational factors Source

No	Factors	Source
1	Employee readiness	Oliveira, T., Thomas, M., & Espadanal, M. (2014); Low, C., Chen, Y., & Wu, M. (2011); Shah, N., & Ghulam Sarwar Shah, S. (2010); Jansen, W. and Grance, T., 2011.
2	Management Support	Low, C., Chen, Y., & Wu, M. (2011);(Krutz, R.L. and Vines, R.D., 2010.) (Buyya, R., Beloglazov, A. and Abawajy, J., 2010); Grobauer, B., Walloschek, T., & Stöcker, E. (2011)
3	Culture of Saudi Government	Hameed, M. A., Counsell, S., & Swift, S. (2012). A conceptual model for the process of IT innovation adoption in organisations. Journal of Engineering and Technology Management, 29(3), 358-390. Al-toraifi: Promoting culture is Saudi government policy (2016).
4	Vision of the organisation	Alshamaila, Y., Papagiannidis, S. and Li, F., Zhao, Y., Raicu, I., & Lu, S. (2008, November); Misra, S. C., & Mondal, A. (2011); Low, C., Chen, Y., & Wu, M. (2011); Avram, M. G. (2014); Lin, A., & Chen, N. C. (2012).
5	Change Management competencies	Buyya, R., Yeo, C. S., & Venugopal, S. (2008, September); Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009); Beloglazov, A., Abawajy, J., & Buyya, R. (2012); Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A.
6	Cost of infrastructure	Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A & Zaharia, M. (2010). Buyya, R., Yeo, C. S., & Venugopal, S. (2008, September); Iosup, A., Ostermann, S., Yigitbasi, M. N., Prodan, R., Fahringer, T., & Epema, D. H. (2011); Rochwerger, B., Breitgand, D., Levy, E., Galis, A., Nagin, K., Llorente, I. M.

Table 3-1 indicates that source of previous studies for organisational factors

Table 3-2 KSA environmental factors Source

No	Factors	Sources
1	Legislation and policy concerns	Ko, R. K., Jagadpramana, P., Mowbray, M., Pearson, S., Kirchberg, M., Liang, Q., & Lee, B. S. (2011, July); ComPUtING, C. (2011); Pearson, S., & Benameur, A. (2010, November); Paquette, S., Jaeger, P. T., & Wilson, S. C. (2010); Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., ... & Zaharia, M. (2010).
2	Government intervention	Kshetri, N. (2010); Chen, Y., Paxson, V., & Katz, R. H. (2010); Schweitzer, E. J. (2012); Wu, W. W., Lan, L. W., & Lee, Y. T. (2013); Nkosi, M. T., & Mekuria, F. (2010, November); Marks, E. A., & Lozano, B. (2010); Thomas, P. Y. (2011).
3	KSA culture	Chanchary, F. H., & Islam, S. (2011, December); Alharbi, S. T. (2012); Yavas, U. (1997); Alotaibi, M. B. (2013); Alghamdi, S., & Beloff, N. (2014, September); Al-Maliki, S. Q. A. K. (2014).

Table 3-2 indicates that source of previous studies for environmental factors

Table 3-3: Technological factors Source

No	Factors	Source
1	Users' trust	Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., ... & Zaharia, M. (2010); Pearson, S., & Benameur, A. (2010, November); Ko, R. K., Jagadpramana, P., Mowbray, M., Pearson, S., Kirchberg, M., Liang, Q., & Lee, B. S. (2011, July); Tian, L. Q., Lin, C., & Ni, Y. (2010, October)
2	Service quality	Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009); Buyya, R., Yeo, C. S., & Venugopal, S. (2008, September); Lee, J. Y., Lee, J. W., Cheun, D. W., & Kim, S. D. (2009, December)
3	Usefulness of the system	Low, C., Chen, Y., & Wu, M. (2011); Behrend, T. S., Wiebe, E. N., London, J. E., & Johnson, E. C. (2011); Antonopoulos, N., & Gillam, L. (Eds.); ComPUtING, C. (2011); Rimal, B. P., Jukan, A., Katsaros, D., & Goeleven, Y. (2011); Calheiros, R. N., Ranjan, R., Beloglazov, A., De Rose, C. A., & Buyya, R. (2011).
4	Data security	Subashini, S., & Kavitha, V. (2011);Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., ... & Zaharia, M. (2010).; Zissis, D., & Lekkas, D. (2012); Takabi, H., Joshi, J. B., & Ahn, G. J. (2010); Sangroya, A., Kumar, S., Dhok, J., & Varma, V. (2010); Somani, U., Lakhani, K., & Mundra, M. (2010, October); Grobauer, B., Walloschek, T., & Stöcker, E. (2011).
5	Privacy	Takabi, H., Joshi, J. B., & Ahn, G. J. (2010); Zhou, M., Zhang, R., Xie, W., Qian, W., & Zhou, A. (2010, November); Itani, W., Kayssi, A., & Chehab, A. (2009, December); Jansen, W., & Grance, T. (2011); Pearson, S., & Benameur, A. (2010, November).
6	Lack of IT standards	Grobauer, B., Walloschek, T., & Stöcker, E. (2011); Subashini, S., & Kavitha, V. (2011); Garrison, G., Kim, S., & Wakefield, R. L. (2012); Lin, A., & Chen, N. C. (2012); Hofmann, P., & Woods, D. (2010).

Table 3-3 indicates that source of previous studies for Technological factor

The hypotheses formulated for this study are:

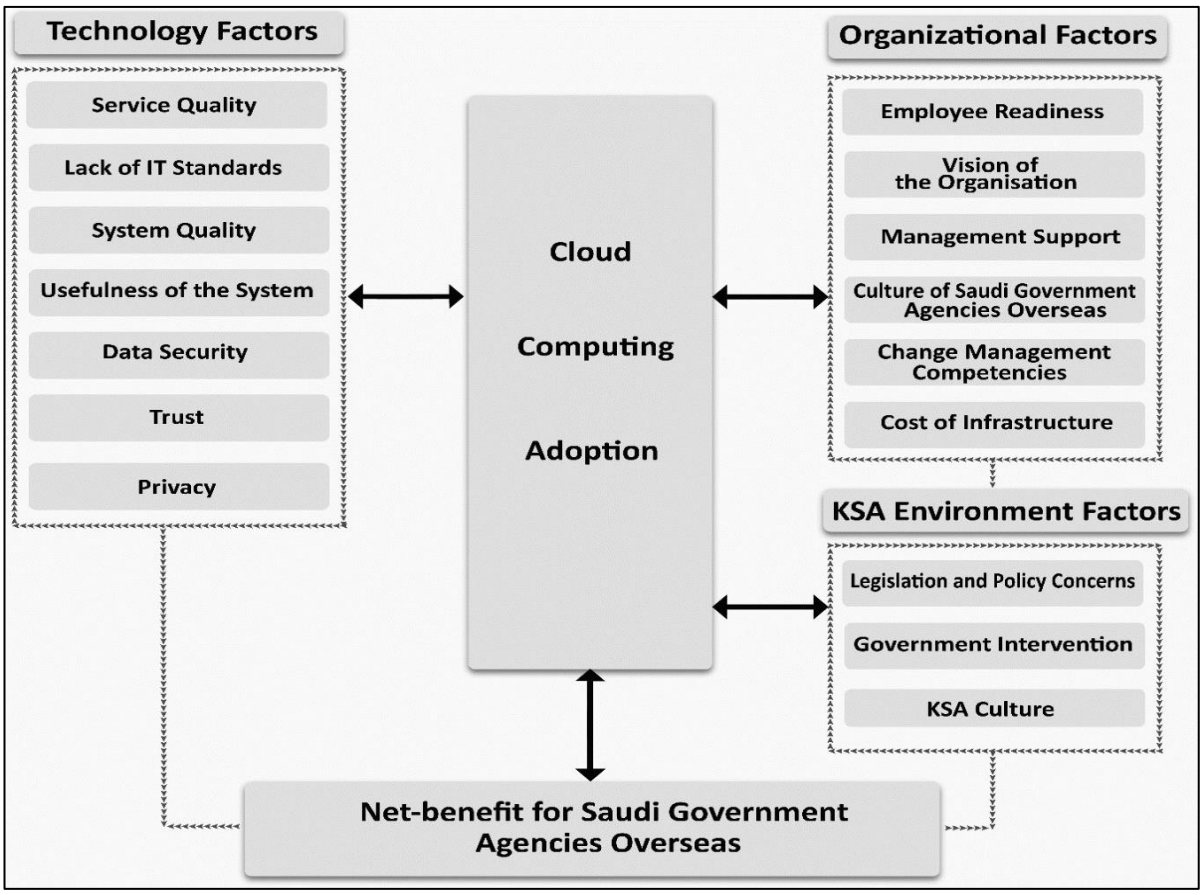

Figure 3-1 the proposed framework for adoption of cloud computing in Saudi Government agencies overseas

3.3 Organisational factors

3.3.1 Employee readiness

Organisations promote the usage of cloud computing through training and enhancing the experience of the employees with the use of cloud computing. If the employees are not fully trained and prepared to manage cloud computing services and deliver them to the end-users, the intention to adopt cloud computing can be aborted. Kuo (2011) found that the decision to adopt cloud computing for the improvement of health care services was affected by the level of expertise possessed by the staff. The management of the organisation may face failure in successfully implementing cloud computing if the factor of employee readiness has not been taken into consideration prior to the adoption of cloud computing (Twati & Gammack, 2006).

3.3.2 Management support

Management support is another key factor which has the potential to affect the decision to adopt cloud computing. A visionary and ambitious management team of an organisation can perceive the benefits of new technologies and their implementation (Lian et al., 2014). It is the management an organisation which studies the market situation and assesses the benefits of cloud computing services to the organisation and consumers (Ibid). Low et al. (2011) found that top executive support is a critical factor in taking the decision to adopt cloud computing. Similarly, Marston et al. (2011) rated management support as a key factor which can affect the decision of adoption of cloud computing.

3.3.3 Organisational culture

The organisational culture determines the success or failure of the adoption of cloud computing. Twati and Gammack (2006) showed that organisational culture in Libya discouraged the use and adoption of cloud computing. This was because the employees of many organisations were not familiar with data management via cloud computing. Takabi et al. (2010) also showed the positive impact that organisational culture can have on the adoption of cloud computing. Some other studies conducted in both small and large organisations revealed the relevance of organisational culture with the successful adoption of information systems and information technologies (Buonanno et al., 2005; Luoma & Nyberg, 2011; Wu et al., 2011).

3.3.4 The vision of the organisation

Previous research in the field of information systems argued that early adoption of a technological innovation is based on an organisation's vision. This vision serves key functions in interpretation, legitimisation and the organisation and mobilisation of economic roles and exchanges to adopting new technology (Swanson & Ramiller, 1997). Ngai et al. (2008) found that the vision of the organisation vision and management support were the most frequently cited critical factors to the successful implementation of new systems, such as cloud computing and ERP systems.

3.3.5 Change management competencies

When the organisation intends to change the technologies to innovate its processes and products, the change management strategies hold critical value in respect of changing the behaviour of the employees and consumers towards the newly installed technological applications (Tushman & O'Reilly, 2006). The change management competencies help management to install the suitable change management strategies needed to motivate the employees to use cloud computing applications (Fui-Hoon Nah et al., 2001). Without having the change management competencies in

place the organisation cannot successfully implement the change, and this will have a negative effect on the successful adoption of cloud computing.

3.3.6 Cost of infrastructure

The infrastructure costs can affect the decision to adopt cloud computing. The evidence regarding the impact of infrastructure on the adoption of cloud computing has been provided by Low et al. (2011), who found that organisations with limited resources would not be able to import and subsequently use cloud computing. Marston et al. (2011) identified that if the cost of infrastructure exceeds the available financial resources of the organisation, the decision to adopt cloud computing cannot made by the organisation's managers. Sultan (2010) similarly reported that the associated costs of training staff, importing cloud computing toolkits and contracts with third-party suppliers of cloud computing services are expensive, particularly for educational institutions. This, therefore, hampered the intended implementation and adoption of cloud computing for education institutions. This shows that infrastructure costs play a critical role in the decision of adopting cloud computing.

3.4 Technology factors

There are a number of issues in relation to technology that have a significant bearing on cloud adoption. This includes overall trust in the technology in terms of users, service quality, security and privacy and IT standards.

3.4.1 User's trust

User's trust is paramount when making the decision of whether or not to adopt cloud computing. The cloud computing applications offers the landscape of opportunities and challenges for the organisation and users to adopt it. For most of the organisations, the adoption of cloud computing is a major concern, which not only arises from the providers of cloud computing applications, but also from the capabilities that cloud computing has to offer (Bamiah et al., 2012). Lian et al. (2014) showed that in cases where users trust cloud computing, this positively affects the process of adopting cloud computing. However, the study conducted by Alsanea et al. (2014) also showed that a lack of users' trust negatively affects the adoption of technological innovations.

3.4.2 Service quality

The quality of the services available through cloud computing applications is another important factor affecting the decision of whether to adopt cloud computing applications. Several studies

reported the positive influence of service quality on the decision of whether to adopt cloud computing services in the organisation (AbuKhousa, 2012; Bernsmed et al., 2014; Lian et al., 2014; Low et al., 2011). AbuKousa (2012) showed that greater reliability, security and scalability increase the quality of services, which affects the decision of adopting cloud computing services in the health care sector.

3.4.3 System quality

System quality is increased by scaling cloud computing applications to meet the organisational and user requirements. The system quality also increases the users' satisfaction with the services provided by cloud computing applications. Low et al. (2011) found the system quality is an important factor which positively affected the decision of adopting cloud computing. Likewise, Bamiah et al. (1012) also reported that system quality can affect the decision to adopt cloud computing. Armbrust et al. (2010) showed that system quality can increase the usage of cloud computing among employees of the organisations, showing system quality as key factor for the adoption of cloud computing.

3.4.4 Usefulness of the system

Cloud computing will be adopted only when the consumers consider it as useful for processing the required functions. The management of data via cloud computing applications has been greatly enhanced through the use of cloud computing. One study showed that consumers would be willing to use the system if it helped them to process data in a more effective manner (Behrend et al., 2011). Another study reported that system usefulness positively influenced the technological adoption of cloud computing in small and medium sized enterprises (Low et al., 2011).

3.4.5 User's data security

Data security is a major issue faced by the management of organisations which impacts the decision of whether to adopt cloud computing. For the adoption of e-Health cloud computing, AbuKhousa (2012) found that data security positively affected the adoption of cloud computing. Lian et al. (2014) reported a similar finding for the adoption of cloud computing in Taiwan hospitals. This shows that data security is a big challenge in the adoption of cloud computing. Therefore,

3.4.6 User Privacy

User privacy is as an important concern for the leadership of an organisation when making the decision of whether or not to adopt cloud computing. AbuKhousa (2012) found that e-health faced technical challenges regarding the privacy of cloud computing and similarly, Alsanea et al. (2014)

also reported a similar finding regarding impact that cloud clouding applications had on privacy within organisations.

3.4.7 Lack of IT standards

While other industries, such as the computer and financial industries, have long established and uniformed IT standards for adopting new technology, government sectors have lagged behind (Eric et al., 2006). The lack of IT standards makes it difficult for an organisation to adopt cloud computing. The lack of IT standards may have a negative impact on the adoption of innovative technology (Poon et al., 2004).

3.5 Environmental factors

There are a number of environmental factors that have significant influence in cloud adoption. These include the legislative framework within which organisations and cloud provider operate, government policy and of particular relevance to the present study, culture in Saudi Arabia.

3.5.1 Legislation and policies concerns

Government policies and legislation regarding how cloud computing applications are imported and implemented can affect the decision of whether or not to adopt cloud computing within an organisation. The legislation and policies may support or ban cloud computing due to challenges in implementation, including data security and privacy. Several studies have supported the impact that legislation and policy concerns have on the decision of where or not to adopt cloud computing. Bernsmed et al. (2014) reported that legislation and policy concerns were found to be one obstacle which affects the adoption of cloud computing in health services. Additionally, AbuKhousa (2012) showed that legislation was an important factor in the adoption of e-health computing which positively influenced the adoption of cloud computing.

3.5.2 Government intervention

Government intervention is another challenge facing public sector organisations when considering whether to adopt cloud computing applications. The government will either support or reject the adoption of cloud computing in public organisations. Low et al. (2011) reported that government support has positively affected the decision of whether to adopt cloud computing. Similarly, Marston et al. (2011) showed that government's willingness to provide cloud services in public organisations was a great challenge when considering adopting cloud computing applications.

3.5.3 KSA culture

Existing cultural conditions always determine whether, when, how and in what form a new innovation will be adopted (Dunphy & Herbig, 1995). Hofstede (1980) argues that many of the differences in management styles and organisational practices of companies throughout the world can be related to differences in the collective mental programming of people in different national cultures. Hoque and Bao (2015) found that cultural dimensions had a significant impact on the decision to adopt innovative technology in developing country. Al-Gahtan et al. (2007) revealed that the cultural dimensions of Saudi Arabia influence the adoption of IT.

Chapter 4 Research Methodology

4.1 Background

In order to achieve the aims and objectives of the study and to answer the research questions, the study adopts a mixed methods survey approach using both quantitative and qualitative methods. This chapter provides a justification for these methods and how they are applied in the study.

4.2 Design of the research

The following quantitative and qualitative research methods are the research approaches which have been used in this study. These methods are commonly applied to conduct research, however, more often studies either use quantitative or qualitative methods according the aims of a study and the type of data they need.

4.2.1 Quantitative research approach

This approach explains the phenomenon through measurements of the variables and factors affecting the social world. These measurements give the quantified impact of the factors/independent variables on the dependable variables (Hagenzieker et al., 2014). The observations are recorded in the form of mathematical calculations, numerical facts and figures relating to the properties of the phenomenon under investigation.

The drawback of this approach is that it does not provide in-depth insight into the different aspects of the social world which is experienced by people (Creswell, 2013). An in-depth study can be carried out only through gathering the experiences of the people about the world in which they live (Hagenzieker et al., 2014). Therefore, the quantitative approach will not address the research issue relating to the feasibility of adopting cloud computing because it does not explain the views of the people about cloud computing utilities or explore the factors for developing the framework for adopting cloud computing.

Questionnaires were included 39 question items in total. Thirty-five questions items (35) were based on the proposed Saudi government Overseas Agencies SGOA framework, the other four items gathered demographic information about their previous experience and use of technology in their organisation.

However, where there is a large sample of people from which views need to be derived, quantitative methods such as questionnaires are suitable. Moreover, questionnaires produce quantitative data that can be analysed using statistical analysis.

4.2.2 Qualitative research approach

A qualitative research method takes a small number of samples and studies them in depth, over time, to produce theories and models which can be proved through conducting a qualitative investigation. This method records the personal experiences, emotions, ideas and opinions of the population about certain phenomenon in the social science world and based on these accounts, a theoretical framework/model is developed. (Maxwell, J.A., 2012.) .

Qualitative data has been analyzed by using NVivo data analysis software which will enable the researcher to draw the important themes and codes, followed by comparison with themes and development of merged themes (basically, coding is the process of marking segments of data (usually text data) with symbols, descriptive words or category). The use of merged themes will allow the researcher to infer the important findings for the phase I of this study. In this study the framework factors used were themes to annotate the interviews. The study will also explain the behaviour of respondents to acknowledge the questionnaire, expressing the persisting trends about horizontal subsets of questions and their expected answers which can lead the researcher to conclude the initial analysis during first stage of the study that will follow more rational examination.

The drawback of this method is that the observer constitutes part of the observed world and their motions and attachments with this world can affect the interpretation of the data (Kruth, 2015). Consequently, this can lead to the generation of biased results when explaining the phenomenon.

4.2.3 Mixed method approach

Due to the limitations of both quantitative and qualitative research approaches, a pragmatic approach espouses the development of a new research approach which can allow the use of multiple research methods, namely, qualitative and quantitative, to offset the merits and demerits of one another within a single study. For this purpose, a mixed method approach is developed which favours the use of both quantitative and qualitative research methods in order promote the reliability and strength of the outcomes of the study (Imran & Yusoff, 2015). This study will use a mixed method approach to address the research issue under investigation.

4.2.4 Research setting

This research has been consisted of four key stages to meet the aims and objectives of the study. In first stage the relevant literature and definitions of cloud along with the adoption of cloud computing in the given environment, will be reviewed. In the second stage, semi-structured interviews will be designed to identify the need for cloud computing and the associated concerns for adoption by Saudi government agencies. In the third stage a survey questionnaire will be

designed which will be conducted in order to collect quantitative data from which key aspects will then be inferred. In the fourth and final stage, the data analysis tools, inferential and descriptive tools of statistics, will be applied to analyse the data collected through the questionnaires and semi-structured interviews.

To validate the results from the research methods employed in this study, triangulation will be used (Wilson, 2014). The triangulation confirmation of the proposed framework for this study is illustrated in Figure 4-1. In order to verify hypotheses, the three main tasks of this research study will be subjected to the triangulation method (Figure 4-1). After conducting the experts' interview and the completion of questionnaire, the findings and the results will be reported and analysed.

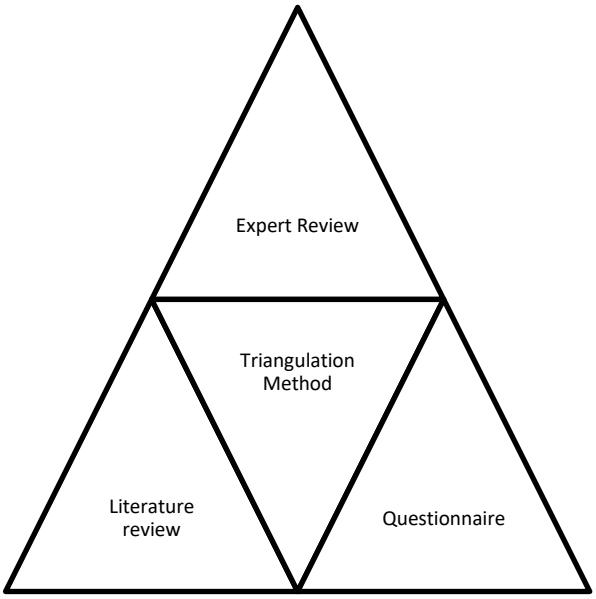

Figure 4-1 Triangulation confirmation of proposed framework

4.3 Data collection instrument development

This section describes the research methods that are adopted in this study. There is also a presentation of how they are developed in order to achieve the aims of the study.

4.3.1 Web-based survey questionnaire

The quantitative data will be collected through a web based survey to test the predictive power of selected variables on the adoption of cloud computing. This will constitute the Quantitative Phase II of this study. The survey will be developed and analysed quantitatively. To record the response of the survey items a Likert type scale consisting of five points Likert-type scale was used to increase response rate and response quality along with reducing respondents' "frustration level" (Babakus and Mangold 1992). As with the questionnaire, the 16 variables will cover the major aspects and many other factors needed for the completion of this study.

Distinct and descriptive information will be given to the participants such that the comprehension of the questions and points in the survey become easy and clear for them. The purpose and objective of the study will be explained to the respondents using an introductory letter issued with the questionnaire. The researcher will keep the identity of each respondent private, even if someone mentions their particulars on the given questionnaire. Each participant will be assured that their responses and their particulars will not be disclosed to any third party and will only be used for the purposes of this research. Major Saudi Government Overseas Agencies, such as Saudi Cultural Bureau in London, will be selected and the questionnaire will be distributed among their employees.

The web-based survey instrument will involve dichotomous questions and Likert scale points. Basically, dichotomous scale was used in instances where there were only two possible responses the likert scale was used given that it was the most appropriate in measuring the attitudes by estimating the extent to which participants agreed or disagreed with a given statement.

After the interview data collection period was over, the translation of data has been done thru an official department called Department of Translation and Interpretation in Saudi cultural bureau in London.

The questionnaire has been divided into various sections to obtain the viewpoints about the adoption of cloud computing and demographic background. A salient feature of the questionnaire is that every point of the questionnaire is bilingual, i.e. English and Arabic, and a translation of every question will be given to ensure the easy understanding of every respondent. Approximately 200 questionnaires will be distributed among the employees of the participating organisations. Table 4-2 shows the number of participants for each organisation.

The closed-ended questions were designed using a five-point Likert scale: strongly agree = 5; agree = 4; neutral = 3; disagree = 2 and strongly disagree = 1, and there were other questions which simply required yes or no answers.

4.3.2 Expert review

The study also employs an expert review which is a research method whereby the researcher can collect data from experts who have knowledge and experience of the subject that is being studied. An expert review may be quantitative, qualitative or mixed methods in nature (Tessmer, 1993). The expert may offer opinions or make recommendations to improve aspects of the study. This method allows the researcher to have access to people who have experience in the area of study rather than those who may be inexperienced, although it is important to note that it may be expensive in some circumstances (Ramirez, 2002).

4.3.3 Interview design

The aim of the interviews is to reveal the opinions and attitudes towards the relevant aspects of cloud adoption that were identified as factors in the literature and the theoretical framework of this study. These were analysed and collated into a framework as described in chapter 3.The interview questions included closed and open-ended questions. Other interview questions were open to allow the participants to reveal organisational requirements and attitudes toward cloud adoption as well as concerns (see sample in Table 4-1).

Multiple Choice- this question type is useful when the researcher would like participants to select the most relevant response.

The following is a sample of the interview questions:

Q1: How important is the **influence** of the following factors the adoption of cloud computing services in Saudi Arabia government agencies overseas?

Table 4-1 Sample of the interview questions

Category 1: Technology factors that influence the adoption of cloud computing					
Attributes	Very important	Important	May be important	Not important	Not relevant
Service quality	☐	☐	☐	☐	☐
Lack of IT Standards	☐	☐	☐	☐	☐
System Quality	☐	☐	☐	☐	☐
Usefulness of the System	☐	☐	☐	☐	☐
Data Security	☐	☐	☐	☐	☐
Trust	☐	☐	☐	☐	☐
Privacy	☐	☐	☐	☐	☐

4.3.4 The sample size

It is good to indicate the sample size before carry out this initial study. The participants were sampled from a number of different government agencies (see Table 4-2). The questionnaire will be distributed to IT professionals in different Saudi agencies overseas through an online tool to IT professionals. The purpose of the survey design and distribution is to investigate factors that can influence the adoption of cloud computing in Saudi government overseas agencies.

Table 4-2: Sample of Government Agencies Participant

Government Agencies	No. of Participants
Saudi Embassy - London	2
Saudi Airlines -London	1
Saudi Cultural Bureau-London	4
IT Experts	3

4.3.5 Limitation of minimum sample size

Statistical power analysis was used to calculate the minimum sample size for this study. G*Power software was used to assist acquisition of the minimum sample size (see Table 4-3).

*Table 4-3 Sample size according to G*Power software for questionnaire*

Statistical Test	Means: Difference from constant (one sample test)
Tails	Two
Effect size (d)	0.8
Error probability (α)	0.05
Power (1– β error probability)	0.95
Minimum sample size	23

The details of determine the minimum sample size are:

- Effect side, d

  There are three parameters that determine an effect size: small, medium and large (Cohen, 1988). This effect size for this research is large (0.8).

- Type I error, α

  The accepted value for this study is 0.05. This means the probability of rejecting the null hypothesis is 5% if it is true. The 0.05 value is also the usual value for alpha.

- Type II error, 1– β error probability

  The accepted value for this study is 0.8. Type II error shows that the null hypothesis will not be rejected if it is false (Banerjee et al., 2009). The 0.8 value is also the usual value for power.

One sample test used to test the following: Statistical difference between a sample mean and a known or hypothesized value of the mean in the population.

The large effect size is used as we are exploring an area that is a new model.

4.3.6 Data analysis

For Phase II of this study, descriptive and explanatory statistical tools will be employed for the presentation of data. During this method, collected data, outlines, facts and numbers relevant to the distribution, central tendency, average, mean normality measures will be measured and presented in graphical or tabular interfaces. The methods will be further elaborated to describe the parameters and considerable aspects of information required in the study.

Using the 'selected sampling' approach the samples will be collected from the participants of the study from the selected organisations. The interpretation of data will be performed on the basis of two major segments. The first stage is the input of the quantitative information in tabular format using Microsoft Excel as obtained through survey. During the next stage the quantitative information will be given coded and then analysed using SPSS.

SPSS Statistics is a software package used for logical batched and non-batched statistical analysis. Long produced by SPSS Inc., it was acquired by IBM in 2009. (Green, S.B. and Salkind, N.J., 2010.)

During this interpretation exercise the questions of primary research will show up the major difference to the items of the questionnaire. To be precise, around 16 variables will be classified as key variables and hence, a cross tabulation may be needed to interpret the data and draw conclusions about the adoption of this technology. During the quantitative analysis, the data may be structured to analyse in descriptive and one way frequency statistics for the regression analysis and inferential statistics.

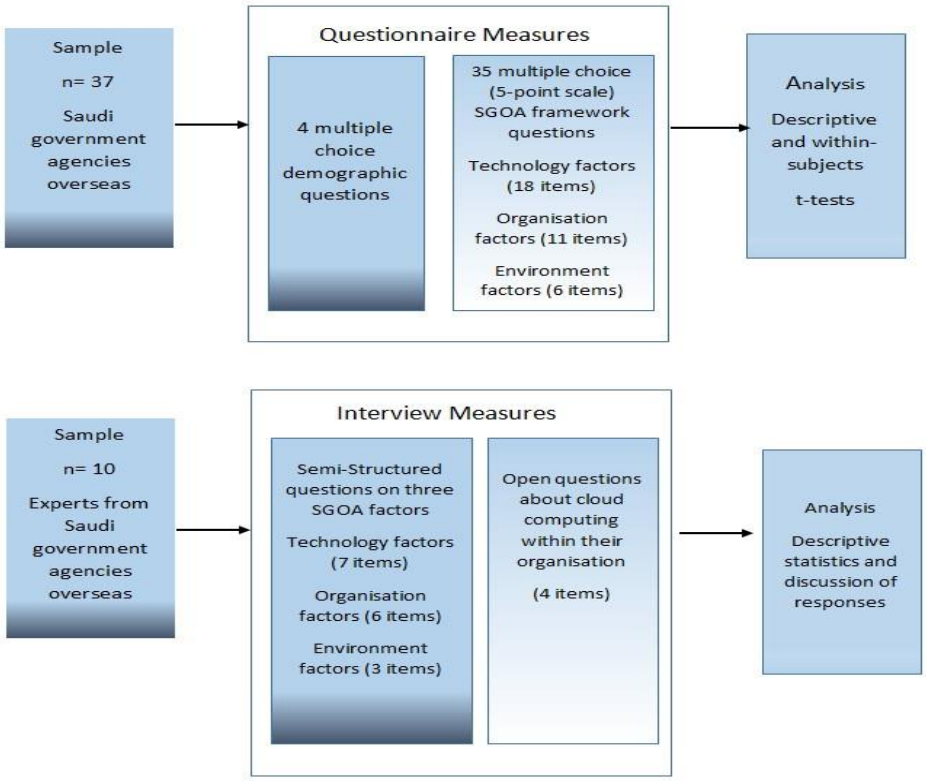

Figure 4-2 Data analysis diagram

Figure 4-2 indicates that a mixed method approach was developed which used both quantitative and qualitative research methods to measure 16 variables with a number of samples and how the major aspects for the completion of this study will be covered with the analysis describing each method.

4.4 Ethical approval

Before carry out interviews with experts and distributing the questionnaire to participants, ethical approval form was submitted to the Ethics Research Governance Online (ERGO) committee at Southampton University to get approval. The reference number is 21575. Before the questionnaire distributed to participants, the ethical approval has been approved from Committee at University of Southampton.

Chapter 5 Results and Discussion

5.1 Introduction

This chapter presents the findings of the study from both the questionnaires and the interviews. Specifically, the results are presented according to the factors that are found in the adopted framework, namely, technological, organisational and environmental factors which relate to adoption of the cloud by Saudi Government Overseas Agencies.

5.2 The results of the questionnaires

Questionnaires were collected from 37 different participants from Saudi government agencies overseas in the UK. The questionnaires included 39 question items in total. Thirty-five questions items (35) were based on the proposed Saudi government Overseas Agencies SGOA framework, with respondents rating their level of agreement with a range of statements on a 5-point scale.

The other four items gathered demographic information about their previous experience and use of technology in their organisation

As per the adopted SGOA framework, three factors; technology, organisation and environment, were explored.

5.2.1 Demography distribution

There were three questions exploring the demographic attributes of respondents. The first question sought to find their years of experience. This question was framed as follows “Choose the option that best reflects your years of experience”. There were 14 respondents who had more than 10 years of experience, 11 with years of experience between 6-10 years, 10 respondents with 2-5 years of experience and only two with less than 2 years of experience (see Table 5-1).

Choice of the four demographic items was informed by the fact that such items seemed to be more influential in individual decisions to adopt cloud computing, and therefore participants were screened based on factors such as number of years of experience, whether they have worked with IT in their organisation, whether the organisation utilises cloud services, and whether they believe security affects the organisation’s use of cloud services. Individuals with more extensive experience in their governmental position were expected to be able to provide better feedback regarding their company’s adoption of cloud services. Furthermore, security is the main concern of any governmental organisation, and therefore it was expected that people who were more concerned about security would be less willing to adopt cloud services.

Table 5-1: Years of experience experts from questionnaire

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	More than 10 Years	14	37.8	37.8	37.8
	6-10 Years	11	29.7	29.7	67.6
	2-5 Years	10	27.0	27.0	94.6
	Less than 2 Years	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

The second question was asked in order to know if the respondents have worked on an IT project for a government organisation. This question was "Have you worked on an IT project for a government organisation?" Thirty out of thirty-seven respondents answered "Yes" (Table 5-2).

Table 5-2: Working at government organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	7	18.9	18.9	18.9
	Yes	30	81.1	81.1	100.0
	Total	37	100.0	100.0	

The third question sought to gather information about whether the respondents' organisation has cloud services. Only eight out of 37 had cloud services in their organisations (Table 5-3).

Table 5-3: Do you have cloud services at your organisation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	29	78.4	78.4	78.4
	Yes	8	21.6	21.6	100.0
	Total	37	100.0	100.0	

Respondents were also asked if they think security risks could affect their organisation's decision to adopt cloud services in their organisation. Sixteen out of thirty-seven answered "Yes" which is 43.2 percent (Table 5-4).

Table 5-4: Security risks and the cloud services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	21	56.8	56.8	56.8
	Yes	16	43.2	43.2	100.0
	Total	37	100.0	100.0	

5.2.2 Technology factors

Questions five to twenty-two were aimed at gathering information regarding the technology factors. For example, in addressing statement 5 'It is necessary to test the services of cloud computing before it can be applied within our organisation?', respondents were required to pick one of the answers in a Likert scale of level of agreement (Strong agree, agree, neutral, disagree, and strong disagree). Out of thirty-seven respondents, 18.9 percent disagreed, 24.3 percent were neutral, 10.8 percent strongly agreed and 45.9 percent agreed with the statement. Therefore, although there was a higher level of agreement with the statement, there were a significant number who were unsure.

Respondents were asked if they think cloud computing is still complicated, 40.5 percent disagreed while 10.8 percent of the respondent strongly disagreed, 35.1 percent were neutral to the question and only that cloud technology was still complicated while 13.5 percent agreed. Therefore, although there was a significant amount of uncertainty, the respondents mostly disagreed with this idea which suggests that concern about complexity of the cloud is not an issue.

Respondents were asked if they think Service Quality can support organisational performance, 51.4 percent agreed, both neutral and strongly agree were recorded at 18.9 percent and 10.8 percent disagreed. Therefore, the large majority agree with the idea that the cloud can support the organisation, and only a small minority disagreed with this idea.

In response to the idea that cloud computing technology should be available to our IT services to save tasks efficiently.68 percent of the respondents agreed and 10.8 percent strongly agreed while 16.2 percent were neutral and only 5.4 percent disagreed. Therefore, there was a strong level of agreement with this and only a small number were unsure.

In reference to the idea that Having quality service would support us to use cloud computing technology, 62.2 percent agreed and 13.5 percent strongly agreed with this idea while neutral responses were at 13.5 percent. There were only 10.8 percent that disagreed. Therefore, the vast majority of the respondents would be happy to have high quality from the cloud.

Just above half, 54 percent, of the respondents agreed that Lack of IT standards affects the adoption decisions of cloud computing and 5.4 percent strongly agreed, however, there was a significant 24.3 percent were neutral and only 16.2 percent disagreed. Therefore, although more than half agreed with this idea, a significant number were unsure. In an associated statement, respondents were asked if cloud service should be available to support lack of IT standards, 51.4 percent agreed, 16.2 percent strongly agreed and 24.3 percent were neutral while 8.1 percent disagree offering similar results.

The question that was asked if Should consider System Quality when adopting cloud computing, 51.4 percent of the respondents agreed with this question, while 21.6 percent opted to be neutral, 10.8 percent strongly agreed and 16.2 percent disagreed. Again, although over half agreed with the idea, a considerable number were unsure.

In further reference to the influence of the existing system of an organisation on cloud adoption, 35.1 percent of respondents strongly agreed and 51.4 agreed that the use of cloud computing in their organisation would help enhance their system, 10.8 percent remained neutral and only 3 percent disagreed. Therefore, there was a very strong agreement that the cloud would benefit the organisation.

The question regarding the consideration of the usefulness of the system when adopting cloud computing was received with 73 percent of agreement with 18.9 percent staying neutral and only 2.7 percent strongly agreed and 5.4 percent disagreed.

There was strong agreement with the idea that adopting cloud computing would help respondents accomplish their activities timely and efficiently with 45.9 percent agreed and 43.3 percent strongly agreed, 8.1 percent were neutral and only 2.7 percent disagreed that cloud computing would help respondents accomplish their tasks quickly. Support for the cloud because people feel that it will help them in their work is very strong.

In reference to security is a concerns as an influence on cloud adoption, 40.5 percent of the respondents strongly agreed and 40.5 percent agreed that security a factor that could affect their demand for cloud computing. 13.5 percent were neutral and only 5.4 percent disagreed.

Another issue that is related to security is that organisations needed to trust the cloud provider that their data will not be exposed. There was a high level of agreement, 64.9 percent agreed and 18.9 percent strongly agreed with this idea while 16.2 percent were neutral and there was no disagreement. This clearly indicates that trust in the cloud is a significant issue. Further evidence to support the concerns in relation to trust is that although 45.9 percent agreed that cloud computing is trustworthy, 43.2 percent were unsure.

Furthermore, there was a high level of agreement that privacy was a major consideration in cloud adoption, with 59.5 percent in agreement and 16.2 percent strongly agreeing and only 5.4 percent disagreeing. However, there was less agreement with the idea that our data which is stored through cloud computing in overseas countries can be another element of high risk issues with 37.8 percent agreeing and 18.9 percent strongly agreed.

5.2.3 Organisation factors

Ten questions were aimed to gather more information regarding the organisational factors as factors that influence adoption of the cloud. In response to the idea that employee readiness needs to be taking into considerations before using cloud service, 62.2 percent of respondents agreed and 16.2 percent strongly agreed with this idea, 18.9 percent were neutral, and only 2.7 percent disagreed. This means that there is a high level of concern that employees need to be ready for the cloud, but again there was a significant number of respondents who were unsure.

Employees readiness is also related to technical knowledge. In response to the idea that information relating to IT system is a mandatory requirement before cloud computing applied within our organisation 64.9 percent agreed and 10.8 percent strongly agreed, 18.9 were neutral

and 5.4 percent disagreed. Again, there is strong level of concern about an organisational issue while at the same time there is a significant number who gave their answer as neutral.

Organisational vision, which is reflected in organisational strategy was something that 56.8 percent of respondents agreed is important and 8.1 percent strongly agreed with the importance of having to consider vision of the organisation when making the decision of adopting cloud services, 27 percent were neutral. Moreover, 51.4 percent agreed and 21.6 percent strongly agreed that they would be encouraged to adopt the cloud if they had an organisation vision. These results show the importance of organisational vision as an influencing factor for adoption of the cloud.

The questionnaire also considered the role of management as a factor for cloud adoption, 62.2 percent of respondents agreed that approvals from the top management are required before we can install cloud computing within our organisation and 24.3 percent strongly agreed, 8.1 percent were neutral and 5.4 percent disagreed. The importance of the role of management is also confirmed by responses to the idea that that management should be concerned about the service providers' authentication systems that grant access to data, where 54.1 percent of the respondents agreed and 16.2 percent strongly agreed, however, there were 24.3 percent were neutral and only 5.4 percent that disagreed. Therefore, senior management play a significant role in influencing cloud adoption in terms of the perception of employees of these organisations.

Organisation culture should be considered as an important factor for any organisations when adopting cloud and this was supported by 54.1 percent who agreed and 21.6 percent who strongly agreed.

When cloud technology is adopted by an organisation there is significant change and the respondents were asked whether change management competencies is an important factor that should be taken into consideration when adopting the cloud. A total of 59.5 percent of the respondents agreed and 8.1 percent strongly agreed with this idea, however, there was 21.6 percent who were neutral and 10.8 disagreed. Again, although there was a high level of agreement, a significant number were unsure with the idea, a pattern that has developed throughout the results.

In reference to the employees themselves, 43.2 percent agreed that employees with higher competencies for planning and decision making are essential to adopt cloud computing. However, there were 35.1 percent who were neutral and 13.5 percent disagreed. Therefore, there was less support for this idea and a certain level of uncertainty.

Finally, of the thirty-seven respondents who were asked about standardised infrastructure helping the organisations to reduced cost, 45.9 percent of them agreed and 43.2 percent strongly agreed

with this statement. There were 8.1 percent who responded neutral neutrals and 2.7 percent disagreed.

5.2.4 Environment factors

Five questions in the questionnaire were related to the environmental factors. Environmental factors for the cloud adoption include the legislation that government are subject to. A total of 64.9 percent of the respondents agreed and 8.1 percent strongly agreed that legislation with complex policy affects their decision to use cloud services, 16.2 percent were neutral and 10.8 percent disagreed.

Further evidence that legislation and regulation are influential factors that affect cloud adoption is that 45.9 percent of the respondents agreed and 16.2 percent strongly agreed that the policy with law affects their decision to use cloud services. A significant 24.3 percent were neutral to the question and 13.5 percent disagreed. There was also a very strong level of agreement with the idea that clearer government policy guidelines will help to enhance cloud computing adoption with 64.9 percent agreeing and 27 percent strongly agreeing with this idea, and no disagreement.

The respondents were questioned if they thought that government intervention is essential for using cloud services, there was a very strong level of agreement with 56.8 percent agreeing and 10.8 percent strongly agreeing with this idea. However, 21.6 percent were neutral and 10.8 percent disagreed.

In addition to government support was the idea that the culture of a country is an influencing factor on cloud adoption. A very high 64.9 percent agreed that using cloud technology depends on the cultural of the country. However, there were 21.6 percent that responded neutral to the question and only 8.1 percent disagreed with the statement. Not only was the country culture important, but also the culture of the organisation can be an important factor in cloud adoption. In response to the statement “Using cloud technology depends on the cultural of the country in the organisation” 59.5 percent agreed and 5.4 percent strongly agreed to this statement, 21.6 percent remained neutral and 13.5 percent disagreed.

5.2.5 Validity and reliability

The results of the questionnaire were tested using the one sample t-test for significance. This test was carried out for all of the three identified factors which were technological, organisational and environmental.

5.2.6 One-sample t-test

One-sample t-test was conducted on the technological factors to find statistical significance of the proposed attributes. The test value was 3 from 5 point of Likert scale. The results are outlined in Table 5-5. Bonferroni correction was used to control false positive results, α was divided by the total number of factors (n) presented in the questionnaire (0.05/18 = 0.00278). It was found that all technology factors attributes proposed in this study were statistically significant (p-value < 0.00278) except for the factors "Our data which is stored through cloud computing in overseas countries can be another element of high risk issues." and "It is necessary to test the services of cloud computing before it can be applied within our organisation".

Table 5-5: Technology factors One-Sample Test

	Test Value = 3	
	p-value	**Results**
It is necessary to test the services of cloud computing before it can be applied within our organisation	.003	Not Statistically significant
Cloud technology is still complicated.	.002	Statistically significant
Service Quality can support organisational performance.	.001	Statistically significant
The cloud computing technology should be available to our IT services to save tasks efficiently.	.001	Statistically significant
Having quality service would support us to use cloud computing technology.	.001	Statistically significant
Lack of IT standards affective the adoption decisions of cloud	.001	Statistically significant
Cloud service should be available to support Lack of IT standards	.001	Statistically significant
Should consider System Quality when adopting cloud computing.	.001	Statistically significant
Using cloud computing in our agencies will support us to enhance our system	.001	Statistically significant
Should consider the usefulness of the system when adopting cloud computing	.001	Statistically significant
Adopting cloud computing within our organisation will enable us to accomplish our activities timely and efficiently.	.001	Statistically significant
In cloud computing technology, the main element to consider is the safety and security of data	.001	Statistically significant
A factor that could affect our demand for cloud computing can be the security concerns.	.001	Statistically significant
Trust in relation to cloud computing, may be useful to identify between organisational and technological.	.001	Statistically significant
Organisations need to trust the cloud provider that their data will not be uncovered.	.001	Statistically significant
Cloud computing technology is dependable.	.001	Statistically significant
Privacy considered the major matter to any agencies that willing to use cloud computing Service	.001	Statistically significant
Our data which is stored through cloud computing in overseas countries can be another element of high risk issues.	.010	Not Statistically significant

One-sample t-test was conducted on the organisation factors to find statistical significance of the proposed attributes. The test value was 3 from five point of Likert scale. The results are outlined in

Table 5-6. Bonferroni correction was used to control false positive results, α was divided by the total number of factors (n) presented in the questionnaire (0.05/11 = 0.0045). It was found that all organisation factors attributes proposed in this study were statistically significant (p-value < 0.0045).

Table 5-6: Organisation factors One-Sample Test

	Test Value = 3	
	p-value	**Results**
The employee readiness needs to be taking in our consideration before adopting cloud service.	.001	Statistically significant
Information relating to IT system is a mandatory requirement before cloud computing applied within our organisation.	.001	Statistically significant
Have to consider vision of organisation when making the decision of cloud service	.001	Statistically significant
Having vision of organisation would encourage us to use cloud computing	.001	Statistically significant
Approvals from the top management are required before we can install cloud computing within our organisation.	.001	Statistically significant
Management should be concerned about the service provider's authentication systems that grant access to data.	.001	Statistically significant
Culture of organisation should consider as important factor for any organisations when adopting cloud.	.001	Statistically significant
The cultural aspect of each organisation is an important factor that should be Considered when we adopting cloud Service.	.001	Statistically significant
Before applying cloud computing, change management competencies and decisions must be critically evaluated in our organisation for its effective usage.	.001	Statistically significant
The employee with higher competencies for planning and decision making is essential to adopt cloud computing	.002	Statistically significant
Standardised infrastructure helping the organisations to reduced cost	.001	Statistically significant

One-sample t-test was conducted on the environment factors to find statistical significance of the proposed attributes. The test value was 3 from five point of Likert scale. The results are outlined in Table 5-7. Bonferroni correction was used to control false positive results, α was divided by the total number of factors (n) presented in the questionnaire (0.05/6 = 0.0083). It was found that all environment factors attributes proposed in this study were statistically significant (p-value < 0.0083).

Table 5-7 Environment factors One-Sample Test

	Test Value = 3	
	p-value	**Results**
Legislation with complex policy affects our decision to use cloud services.	.001	Statistically significant
Promised commitment towards the Compliance with regulations of the cloud computing is another important factor which affects our decision to use the technology.	.001	Statistically significant
Clearer government policy guidelines will help to enhance cloud computing adoption	.001	Statistically significant

	Test Value = 3	
	p-value	Results
Government intervention is another factor can be effect to our decision to adopting cloud services.	.001	Statistically significant
Using cloud technology depends on the cultural of the country in the organisation.	.001	Statistically significant
Cloud computing adoption also depends upon the culture being followed in the organisation.	.001	Statistically significant

5.3 Interviews findings

The semi-structured interviews were conducted with 10 experts from different Saudi government agencies overseas. There were three semi- structured questions and four unstructured questions. All questions were designed based on the proposed SGOA framework in this research. The IT experts are part of the decision-making process in the agencies and are referred as Interviewee 1, Interviewee 2, and so forth. Each expert was sampled from each Saudi government overseas agency. Each agency was referred as ag1, ag2 and so forth. In accordance to the SGOA framework, the three factors, technology, organisational and environment were explored.

5.3.1 Technology factors

Service quality, lack of IT standards, system quality, and usefulness of the system, data security, trust and privacy were analysed as technology factors. As part of the structured question to interviewees, the first question asked was "How important is the influence of the service quality to the adoption of cloud computing services in Saudi Arabia government overseas agencies". This question and the rest of other structured questions had the following answers: Very important, important, may be important, not important and not relevant on a Likert scale. All structured questions on technological factors were answered as in indicated in Table 5-8 (Valid or Missing).

Table 5-8 Semi-Structured interview questions on technological factors

	Service quality	Lack of IT Standards	System Quality	Usefulness of the System	Data Security	Trust	Privacy
Valid	10	10	10	10	10	10	10
Missing	0	0	0	0	0	0	0

The importance of service quality as an influence on the adoption of cloud computing was rated as important by six out of ten IT experts followed by "may be important" at 30 percent and very important at 10 percent), indicating a strong level of perception of importance for this idea. Moreover, the importance of lack of IT standards influence on the adoption of cloud computing was rated as important by five out of ten IT experts followed by very important at 30 percent and may be important at 20 percent.

The importance of system quality influence on the adoption of cloud computing was rated as may be important by seven out of ten IT experts followed by 10 percent for very important, important and not relevant.

The importance of usefulness of the system influence on the adoption of cloud computing was rated as important by seven out of ten IT experts followed by 30 percent as may be important.

The importance of data security influence on the adoption of cloud computing was rated as very important by six out of ten IT experts followed by 30 percent as important and 10 percent as not relevant.

The importance of trust influence on the adoption of cloud computing was rated as important by four out of ten IT experts followed by 30 percent as may be important, 10 percent as very important and not relevant at 20 percent.

The importance of privacy influence on the adoption of cloud computing was rated as important by four out of ten IT experts followed by 20 percent as very important, may be important and not relevant.

Table 5-9 depicts the mean, standard deviation and the error mean of for the technological factors attributes. Data security has the largest mean followed by the lack of IT standards. The lowest mean was recorded for system quality.

Table 5-9: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Service quality	10	3.80	.632	.200
Lack of IT Standards	10	4.10	.738	.233
System Quality	10	3.10	.994	.314
Usefulness of the System	10	3.70	.483	.153
Data Security	10	4.30	1.252	.396
Trust	10	3.20	1.317	.416
Privacy	10	3.40	1.430	.452

Questions 4, 6 and 7were open to interviewees, answers to these questions would also lead to three factors as per SGOA framework. All answers of Question 7 (What are the challenges that could be faced in your agencies when you using cloud service?) were all based on technical factors. Security had a share of 30 percent followed by the Internet connection at 30 percent, extendibility of existing apps to the cloud at 30 percent and Service Level Agreement (SLA) at only 10 percent (see Table 5-10).

Table 5-10: Open structured questions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	internet	3	30.0	30.0	30.0
	security	5	30.0	30.0	60.0
	Extendibility of existing apps to the cloud	1	30.0	30.0	90.0
	SLA	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Experts insisted on these additional factors to be included as they are also important to be considered before the adoption of cloud computing for KSA overseas agencies.

One of the experts, Interviewee3 of ag3 said *"The speed and the reliability of the internet connection is vital for adoption of the cloud computing".*

Another expert, Interviewee6 of ag6 pointed out *"SLA should be thoroughly scrutinised before agreeing to adopt the cloud computing".*

Another expert, interviewee10 of ag10 hinted that "*extendibility of apps to the cloud can highly influence the adoption of cloud computing*".

5.3.2 Organisational factors

Employees' readiness, top management support, cultural of Saudi Government agencies overseas, organisation vision, change management competencies and cost of infrastructure were analysed as organisational factors.

As part of the structured question to interviewees, the first question was asked "How important is the influence of the Employees' readiness to the adoption of cloud computing services in Saudi Arabia government agencies overseas". This question and the rest of other structured questions had the following answers: Very important, important, may be important, not important and not relevant. All structured questions on organisational factors were answered as in indicated in Table 5-11 (Valid or Missing).

Table 5-11: Semi-Structured interview questions for organisational factors

	Employees readiness	Top Management support	Cultural of Saudi Government Agencies overseas	Organisation Vision	Change Management Competencies	Cost of Infrastructure
Valid	10	10	10	10	10	10
Missing	0	0	0	0	0	0

The importance of employee's readiness influence on the adoption of cloud computing was rated as important by six out of ten IT experts followed by "may be important" at 30 percent and very important at 10 percent.

The importance of top management support influence on the adoption of cloud computing was rated as important by eight out of ten IT experts followed by very important at 20 percent.

The importance of culture of Saudi government agencies overseas influence on the adoption of cloud computing was rated as very important by four out of ten IT experts followed by 30 percent for important and may be important.

The importance of organisation vision influence on the adoption of cloud computing was rated as important by seven out of ten IT experts followed by 30 percent as very important.

The importance of change management competencies on the adoption of cloud computing was rated as important by five out of ten IT experts followed by 30 percent as very important and 10 percent as may be important and not important.

The importance of cost of infrastructure on the adoption of cloud computing was rated as important by six out of ten IT experts followed by 30 percent as very important and 10 percent as may be important.

Table 5-12 depicts the mean, standard deviation and the error mean of for the organisational mean factors attributes. Organisation vision has the largest mean followed by the cost of infrastructure and the top management support. The lowest mean was recorded for employee readiness.

Table 5-12: One-Sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
Employees readiness	10	3.80	.632	.200
Top Management support	10	4.20	.422	.133
Cultural of Saudi Government Agencies overseas	10	4.10	.876	.277
Organisation Vision	10	4.30	.483	.153
Change Management Competencies	10	4.00	.943	.298
Cost of Infrastructure	10	4.20	.632	.200

Questions 4, 6 and 7were open to interviewees, answers to these questions would also lead to three factors as per SGOA framework. Question 4 was specifically for organisation factors in your view, what are the most organisational factors could be effect your decision when you adopting cloud computing?). Out of ten IT experts, the size of organisation was deemed important to be considered by five IT experts for an organisation to adopt cloud computing. This was followed by 40 percent by resistance to the cloud computing, 10 percent by standards.

Additional factors were recommended by experts before KSA overseas agencies adopt the cloud computing. Resistance to adoption of cloud computing and size of the organisation had a large share compared to standards and extendibility (see Table 5-13).

Table 5-13: Open question for organisation factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	resistance	3	40.0	40.0	40.0
	size	5	50.0	50.0	90.0
	standards	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

One of the experts, Interviewee8 of ag3 said "If employees resist the new technology, nothing will work".

Another expert, Interviewee10 of ag4 revealed that "The size of organisation is very important before a decision is made before to adopt the cloud computing services".

5.3.3 Environment factors

Legislation and Policy Concerns, Government Intervention, KSA Culture were analysed as technology factors. As part of the structured question to interviewees, the first question was asked "How important is the influence of the Legislation and Policy Concerns to the adoption of cloud computing services in Saudi Arabia government agencies overseas". This question and the rest of other structured questions had the following answers: Very important, important, may be important, not important and not relevant. All structured questions on technological factors were answered as in indicated in Table 5-14 (Valid or Missing).

Table 5-14: Semi-Structured interview questions on environment factors

	Legislation and Policy Concerns	Government Intervention	KSA Culture
Valid	10	10	10
Missing	0	0	0

The importance of legislation and policy concerns influence on the adoption of cloud computing was rated as important by six out of ten IT experts followed by 30 percent as very important and 10 percent as not important.

The importance of government intervention influence on the adoption of cloud computing was rated as very important by four out of ten IT experts followed by important at 40 percent and may be important at 20 percent .

The importance of KSA culture influence on the adoption of cloud computing was rated as important by four out of ten IT experts followed by 40 percent for may be important, 10 percent as very important and 10 percent by not important.

Table 5-15 depicts the mean, standard deviation and the error mean of for the environment factors attributes. Government intervention has the largest mean followed by legislation and policy concerns. The lowest mean was recorded for KSA culture

Table 5-15: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Legislation and Policy Concerns	10	4.10	.876	.277
Government Intervention	10	4.20	.789	.249
KSA Culture	10	3.50	.850	.269

5.4 Discussion of the results

The results of the interviews and the questionnaires that have been presented in the above are discussed in this section. The structure of the discussion will follow the framework which will reflect the technological, organisational and environmental factors.

5.5 Technology factors

5.5.1 Service quality

Based on the results of the interview, service quality should be taken into consideration because 70 percent of the interviewees expressed it as important and 30 percent pointed it out as may be important. No one disagreed or was neutral about the idea. Since all ten interviewees were experts in the field, their opinion should be respected and any plan to adopt cloud computing for overseas Saudi government agencies should consider service quality as an important attribute. Service quality is an important aspect in any business because it directly affects the end user of a system. Poor service quality will increase churn rate and excellent service quality will retain customers and attract more. This study supports AbuKousa's (2012) research which reported that greater reliability, security and scalability increase the quality of services, which affects the decision of adopting cloud computing services.

In relation to this idea, one of the experts, said;

> "I think the service quality of cloud computing is a very important aspect for my agency and we expect that services provided will have to be of very of high quality".
>
> **(Interviewee 1 of ag1)**

Another expert, mentioned that:

> "Service quality is of vital importance to us as to any other IT services"
>
> **(Interviewee 3 of ag2)**

This was further supported by the questionnaire results where 70.3 percent of the respondents agreed that service quality is important to be considered before adopting cloud computing in Saudi government overseas agencies.

5.5.2 Lack of IT standards

From the findings of this attribute, 80 percent had agreed the importance of lack of IT standards for the adoption of cloud computing for Saudi government overseas agencies. The interviewed experts had shown greater concerns about a lack of standards because government sectors have been left behind on IT standards to adopt on new technology compared to other sectors such as financial institutions and computer industries. Concern about lack of IT standards was also evidenced by the fact that 59.5 of questionnaire respondents agreed that lack of IT standards has influence on the adoption of cloud computing. Only 1 out 14 respondents who have experience of more than 10 years disagreed.

5.5.3 System quality

Ten interviewee experts advised service quality to be combined together with service quality because it is part of service quality to end users. This is evidenced by 70 percent of respondents who consider it as "may be important". System quality deals with ability of the system to scale and therefore, lack of scalability will be considered poor service quality.

In further evidence of this finding one of the interviewees said the following:

> "I will combine system quality with service quality, they are both the same and are important in our agency"
>
> **(Interviewee 5 of ag2)**

Moreover, 62.2 percent of questionnaire respondents agree that system quality has an influence on the decision to adopt cloud computing for Saudi government oversees agencies.

5.5.4 Internet

Another factor that is related to service quality is the internet connection. This factor was proposed by experts to be included as part of the technology factors. One of the experts said the following in support of this idea:

> "Internet connection speed and reliability is a mandatory that all KSA overseas agencies must consider before adopting to cloud computing"

(Interview7 of ag3)

5.5.5 Usefulness of the system

Usefulness of the system was found to be a determining factor in adoption of the cloud, 70 percent of the interviewee experts considered the usefulness of the system to be taken into account before Saudi government overseas agencies decide to adopt cloud computing. This confirms the finding by Behrend et al. (2011) which showed that users would be willing to use the system if it helped the users to increase efficiency in processing data. This also justifies that system usefulness positively influenced the technological adoption of cloud computing in small and medium sized enterprises (Low et al., 2011).

Evidence of this idea is supported in the following statements:

"We will always think of usefulness of the system whenever we want to adopt it"

(Interviewee 8 of ag2) and "Usefulness is a must before we can adopt cloud computing"

(Interviewee 4 of ag2) This idea was also supported by the questionnaire correspondents whereby 75.7 percent of the correspondents also agreed that usefulness of the system should be considered before adopting cloud computing for Saudi government overseas agencies.

5.5.6 Data security

The importance of data security as an influence on the adoption of cloud computing should be considered by Saudi government overseas agencies as 90 percent of the experts have affirmed its importance with only one respondent saying that it was not relevant. These findings justify the studies reported by AbuKhousa (2012) who found that data security have positive effects on the adoption of cloud computing. It was also reported by Lian et al. (2014) on the similar effects of data security on the adoption of cloud computing in Taiwan hospitals.

In the open questions, out of 4 questions, 40 percent of the respondents emphasised the importance of data security on the adoption of cloud computing for Saudi government overseas agencies. This was evidenced by the following statements:

"We will never adopt to cloud service if our data are not secured with strong tools"

(Interviewee 5of ag3)

And

"Data security will be on our first priority"

(Interviewee 10 of ag1)

The security aspect was strongly supported by 81 percent of the questionnaire respondents. They agreed that security should be taken into consideration before a decision is taken to adopt cloud computing for Saudi government overseas agencies.

5.5.7 Trust

The trust of users in relation to cloud computing provider was shown to be one of the important factors on the decision to adopt cloud computing by Saudi government agencies. This was evidenced by 50 percent of the experts who said trust is an important factor to be considered for adoption in cloud computing. The research reported by Alsanea et al. (2014) also showed that a lack of users' trust negatively impact the adoption of technological innovations in government agencies in Saudi Arabia. The following statements from the interviews emphasises the important of trust the cloud computing provider:

"Trust is everything for our agency; if there is a little doubt on trust we will not adopt to cloud computing"

(Interview 6 of ag4)

And

"Trust is second to none, without trust we will not be ready for anything"

(Interviewee 7 of ag1)

The experts who were interviewed suggested considering trust as an organisational attribute and not technology. This is because trust is an organisation attribute; the trust is on an organisation that provides the cloud services and trust on the technology used.

The trust attribute was also taken seriously by the questionnaire respondents, 83.8 percent of the correspondents agreed that an organisation should trust cloud service providers before a decision to adopt cloud computing is taken.

5.5.8 Privacy

Six out of ten experts indicated that privacy must be taken into consideration before adopting cloud computing in Saudi government overseas agencies. These findings are in line with the study reported by Alsanea et al. (2014) on the impact that cloud applications had on privacy within Saudi

government organisations. Evidence of this support for privacy was found in the following statement.

"Privacy is crucial to our agency to accept cloud services"

(Interviewee 2 of ag3)

The experts who were interviewed also suggested to migrate the privacy attribute from the technology factor into the organisational factor. This is because the privacy is dealt with organisational privacy and not technology.

Further support for privacy as an influencing factor for cloud adoption, 75.5 percent of questionnaire respondents also agreed that privacy is the major concern and should be taken into consideration before Saudi government overseas agency adopt the cloud computing.

5.6 Organisational factors

The section presents the findings for the organisational factors as factors for cloud adoption by government agencies outside of Saudi Arabia.

5.6.1 Employee readiness

The employee's readiness factor was pointed out to be of high importance by 70 percent of the experts. This shows that Saudi government overseas agencies should prepare their employees before deciding to adopt cloud computing. The employee's readiness factor is very importance since the management of the organisation may experience failure in successfully implementing cloud computing if the factor will not be taken into consideration before the adoption of cloud computing (Twati & Gammack, 2006). One of the respondents to the interview emphasised the importance of employee readiness in the following statement:

"It will be impossible to adopt cloud computing if our employees are not ready for the technology in terms of training and other skills"

(Interviewee 8 of ag2)

Another responded added:

"I can't imagine an IT system success without employee readiness"

(Interviewee 5 of ag3)

This was supported by questionnaire correspondents, of which 78.4 percent agreed that employee readiness needed to be considered before a decision is made to adopt cloud computing.

5.6.2 Top management support

All interviewee experts agreed that the top management support is critical to the adoption of cloud computing. It is the management that analyses the market situation and evaluates the benefits of cloud computing services to the organisation. Low et al. (2011) reported that top management support is a critical factor in deciding on the decision to adopt cloud computing. This idea was supported by the following response in the interviews:

> "Without top management support any IT system will fail"
>
> **(Interviewee 6 of ag1)**

Furthermore, 86.5 percent of the questionnaire correspondents supported the aspect of top management approval as an essential criterial that should be taken into consideration before adopting cloud computing for Saudi government overseas agencies.

5.6.3 Organisational culture

The findings revealed that 70 percent have shown that culture of Saudi government agencies overseas should be carefully taken into consideration before adopting cloud computing. This justifies the study reported by Takabi et al. (2010) that showed the positive impact that organisational culture could have on the adoption of cloud computing. Other researchers carried out on small and large organisations revealed the importance of organisational culture with the successful adoption of information systems and information technologies (Buonanno et al., 2005; Luoma & Nyberg, 2011; Wu et al., 2011). Evidence that organisation culture is a factor in cloud adoption was found in the following statement:

> "Organisational culture will have an effect on cloud computing adoption"
>
> **(Interviewee 9 of ag4)**

Further support was offered by the questionnaire respondents with 75.7 percent agreeing that organisational culture has an effect on cloud computing adoption.

5.6.4 Organisation vision

Adoption of a technological innovation is mainly based on an organisation vision. Ngai et al. (2008) reported that the organisation vision and management support were the most commonly cited

critical factors to the successful deployment of any new systems. This has been justified by this research whereby all expert interviewees responded that that organisation is important to the adoption of cloud computing for the Saudi government overseas agencies that was evident in the following statement:

> "Organisation vision is everything, without it there is organisation and that means no IT system"
>
> **(Interviewee 3 of ag2).**

The vision of the organisation was supported by 64.9 percent of the questionnaire respondents; that organisation vision determines the adoption of the cloud computing for Saudi government overseas agencies.

5.6.5 Change management competencies

From the findings, 80 percent of the expert interviewees indicated that change management competencies is crucial before adopting cloud computing for Saudi government overseas agencies. These findings are demonstrated by Fui-Hoon Nah et al. (2001), who reported that the change management competencies help management to install any suitable change management strategies needed to motivate employees on the use and adopt cloud computing applications. This idea is clearly supported in the following response to the interviews:

> "Change management competencies is required if we were to have successful adoption of the cloud computing"
>
> **(Interviewee 10 of ag3)**

Further support for the need for change management competency is that 67.6 percent of the questionnaire respondents agreed that a change management competency is an important factor that should be considered before adopting to cloud computing.

5.6.6 Infrastructure cost

IT infrastructure is vital in using the cloud services and applications, organisations with limited infrastructure would not be able to use the cloud computing. This ranges from good internet speed to computing resources. From the findings, 90 percent have said that the cost of infrastructure should be seriously taken into considerations before adopting the cloud computing. This has also been evidenced by Low et al. (2011) on the impact of infrastructure on the adoption of cloud computing. The cost of infrastructure as an implication in cloud adoption was mentioned in the following statement:

"Cost is everything, we are not an IT organisation but IT infrastructure takes a large budget, so anything that will reduce IT operations cost will be welcomed by both hands"

(Interviewee 2 of ag3)

Furthermore, 89.1 percent of the questionnaire respondents agree that cost of infrastructure should be seriously taken into consideration for the Saudi government overseas agencies before adopting to cloud computing.

5.6.7 Organisation size

Organisation size was proposed by experts to be included as part of the organisation factors. One expert said the following:

"In my view, the size of organisation affect the adoption of any technology, we face problems in previous project because of the size. Difficulties are in admiration and training"

(Interview5 of ag3)

5.6.8 Resistance

Resistance to technology was also proposed by experts to be included as part of the organisation factors. One expert in response to resistance to new technology clearly showed that it was a problem for cloud adoption:

"if an organisation is facing a very strong resistance by users to adopt cloud computing then there would be no chance to succeed; we stopped using some technology before because of users' resistance to it"

(Interview 6, ag4)

5.7 Environmental factors

Environmental factors have been shown in the literature to have a significant impact on the willingness to adopt the cloud. Here the results from the primary research of this study are discussed.

5.7.1 Legislation and policy concerns

From the findings, legislation and policy concerns were found to be of vital importance in influencing the adoption of cloud computing for Saudi government overseas agencies as indicated by 90 percent of the interviewees. Bernsmed et al. (2014) indicated that legislation and policy concerns were found to be one of the obstacles which affect the adoption of cloud computing in health services. The importance of legislation and policy generally was emphasised in the following statement:

> "Legislation and policies drive our operations; we will always stick to these if they are clearly stipulated to us before cloud service adoption"
>
> **(Interviewee7 of ag2)**

5.7.2 Government intervention

It was reported by Low et al. (2011) that government intervention has positively impact on the decision of whether to adopt cloud computing. This has been justified by experts in this research whereby 80 percent of them insisted that government intervention must be taken into consideration before the Saudi government overseas agencies decide to adopt cloud computing. The importance of government intervention was evident in the following statement:

> "Government is powerful and will always go with the government if needed for cloud adoption"
>
> **(Interviewee 1of ag 4)**

Respondents from the questionnaire also agreed that government intervention has an impact on the decision to adopt cloud computing for Saudi government overseas agencies.

5.7.3 KSA culture

It was reported by Hoque and Bao (2015) that cultural dimensions had a major impact on the decision to adopt innovative technology in developing countries. Moreover, it was revealed by Al-Gahtan et al. (2007) that the cultural dimensions of Saudi Arabia influence the adoption of IT. This was justified by this research by 80 percent of the experts interviewed, they insisted that KSA culture should be taken into consideration before a decision is made to adopt cloud computing. The importance of culture in IT adoption was summed up in the following statement:

> "Culture identifies us, so we will embrace our culture in any IT system adoption"
>
> **(Interviewee 7 of ag3)**

Moreover, 70.3 percent of the questionnaire correspondents also agree that culture should be taken into consideration before decision is made to adopt cloud computing.

5.8 Revised framework

After quantitative and qualitative data analysis, the framework for cloud adoption by Saudi government agencies outside of the country is presented. The applied framework takes into account new factors that have been found to influence the adoption of cloud computing for Saudi government overseas agencies.

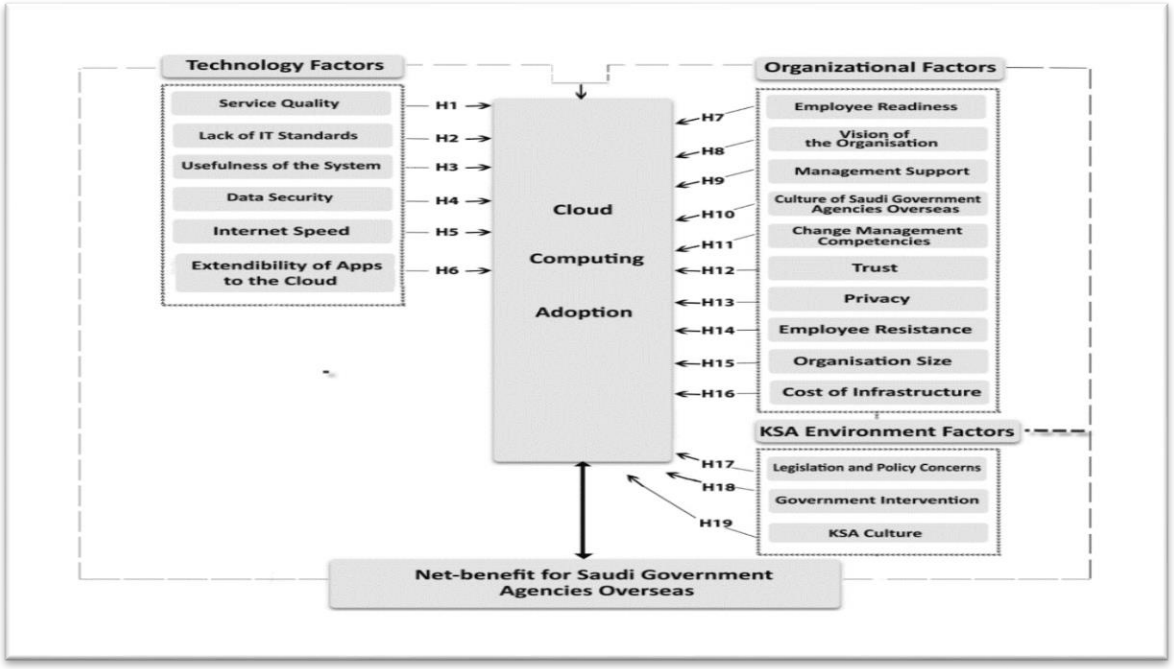

Figure 5-1 Revised SGOA framework

5.8.1 Organisational factors

1- Employee readiness
2- Vision of the organisation
3- Management Support
4- Culture of Saudi Government agencies overseas
5- Change Management competencies
6- Trust
7- Privacy
8- Employee Resistance
9- Organisation Size
10- Cost of infrastructure

5.8.2 Technological factors

1- Service quality
2- Lack of IT standards
3- Usefulness of the system
4- Data security
5- Internet Speed
6- Extendibility of Apps to cloud

5.8.3 Environmental factors

11- Legislation and policy concerns
12- Government intervention
13- KSA culture

A research Methodology for Evaluation follows in the next chapter.

Chapter 6 Research Methodology for Evaluation Study

This chapter presents the research methodology to validate research question number two (What are the key factors that influence the adoption of cloud computing at Saudi Government agencies overseas?) in relation to the research design and the data collection process. In addition to this, this chapter also discusses aspects like size of sample and other factors to consider making the research more accurate and valid regarding findings of the data collection and analysis process.

6.1 Design of the Research

Research design refers to the technique of managing a research project to achieve set goals (Easterby-Smith et al., 2002). A research design addresses the way data collection methods will get utilized to find answers to the research questions (Kerlinger, 1986). An effective research design helps a researcher in managing a healthy flow of research in a project (Sekaran and Bougie, 2010). Due to these reasons, it is very important that a research carefully selects a research design that is most suitable and fitting for the research questions.

For a research project, the purpose of the research can mainly be categorised into three- descriptive, explanatory, and exploratory (Cooper and Schindler, 2003; Saunders et al., 2009). In research studies where the objective is to gain new insights in an existing phenomenon an exploratory research design is usually recommended (Robson, 2002). The explanatory design attempts to identify the link and relationship that exists across different variables of a situation (Saunders et al., 2009). In a way, this study intends to generate insights and explanations underlying the phenomenon studied. In this study, a combination of explanatory and exploratory designs is adopted. For the first phase of the study, exploratory approach is utilized to review existing reliable literature on the issue to gather both quantitative and qualitative data

For the second stage of the research, the approach of research used is explanatory to identify the relationship between variables. As explained by Saunders et al. (2009), a research approach that tries to find linkage and influence of different factors on a phenomenon is explanatory approach. Jackson (1994) makes the argument that the root nature of all types of research studies is ‘descriptive’, and Saunders et al. (2009) also agrees that in both explanatory and exploratory studies, ‘descriptiveness’ of the study can serve as the basis of study. For this project, the later stage of the study uses collected data through questionnaire method to assess the model of cloud computing adoption, and also checks validity of the relationship described in hypothesis.

As confirmed in the chapter 5 of this report, this study makes use of questionnaire method for assessment of the cloud adoption model proposed in the study.

6.2 Questionnaire Design

With the design of the questionnaire method, the objective is to assess the adoption model and to identify reliable answers to the research questions. This study also checks validity of the research hypothesis for relationship between variables. The questionnaire form includes a cover letter that clearly reveals the purpose of this questionnaire to the participants and also asks for written consent of the participants. The entire questionnaire process included three sections, including the following:

Part I: General questions

This section of the questionnaire covers questions relating to the demographic aspects of the participants. Information like age, gender, total experience of the candidates is collected.

Part II: Cloud computing Service

This section of the questionnaire discusses closed-ended questions to understand participant's opinion about cloud computing.

Part III: Understanding the opinion of the participants about organizational aspects

In the final section of the report, the measures of various variables and their relationships have been evaluated. This section also focused on asking close-ended questions on aspects like technological factors, environment of the organization and various organizational factors.

The current questionnaire arose out of the review of the existing cloud adoption and technology adoption questionnaires to select the items that were informative to the current study. Since these tools were not developed specifically for the KSA participants, some of them had to be customised to suit the context of KSA. Also, the questions had to be translated into Arabic by experienced bilingual translators. Care was taken to very much protect the original message of the questions. To ensure that the translation was accurate, another layer of reviewers was added and these checked the translations to indicate whether they were accurate. The pilot study was undertaken using a few participants chosen outside the main study sample to validate the items' reliability and validity"

In this study, a total of 19 factors attached to the research model were assessed for adoption of cloud by using 69 questions in close-ended format. The questions were designed on the basis of existing literature on the subject and some modification was performed to account for context of

Saudi Arabia. A sample of the different factors that were used for the purpose of this study as information sources are shown in the figure 6-1. All of the close-ended questions used in the survey process are developed using a five point Likert scale (Jamieson, 2004). The complete questionnaire was presented to the participants in both English and Arabic translation. Basically, the translation of the interviews and questionnaires was through a professional Bureau service at the Saudi Cultural Bureau and checked by the supervisors.

Part 2 Study Questions

1. To what extent do you agree with the following statements in relation to adoption of cloud services in your organisation?

Factors	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Service Quality	1. Cloud services must work accurately to ensure effective running of our systems operations.					
	2. Equipping our systems with high quality service would encourage us to strive ahead for the usage of cloud computing.					
	3. Cloud computing service enables all the time service accessibility (24/7)					
	4. Cloud computing service also enables easily accessibility through the usage of service anywhere.					
	5. An efficient backup service would definitely regard us to switch to cloud service.					

.

Figure 6-1 the close-ended questions sample.

For the distribution of the completed questionnaire, both electronic and paper-based survey approach was used. For the electronic distribution of the questionnaire, Google's ISurvey toolkit was used to make the questionnaire completely online. A link to the questionnaire designed was then distributed to potential participants using e-mail method of communication and their responses were submitted in the I Survey toolkit instantly. The participants selected were IT professionals currently active in Saudi Government Overseas Agency IT departments. Some IT professionals were also contacted by other means to distribute paper-based questionnaire. Both English version and Arabic translated version of the questionnaire is presented in Appendix E.

6.3 Factor Analysis

The study uses a factor analysis technique as a precondition to performing structural equation models. The structure of the dataset and the research questions of the current study required the use of factor analysis before estimating structural equation models. Foremost, the study entails measuring various factors that cannot be directly observed. These are latent constructs which can

only be measured through their indicators. This therefore implies that each latent variable is measured by more than one indicator. To this end, factor analysis is necessitated to establish the factors that underlie the dataset. Using this technique individual question items or indicator were grouped together with those they shared variance.

It is critical to note that the factor analysis technique is based on critical assumptions that need to be tested to establish whether the dataset is suitable for the technique. For instance, the data has to be suitable for factor analysis and the measurement items (question items) have to measure one dimension of the dataset (no multidimensionality). Data suitability implies that there are meaningful latent factors that explain a significant proportion of variance in the data (Schulz & Watkins, 2007; Kline,1994). Sampling adequacy is another assumption taken by factor analysis. Sampling adequacy tests for the presence of factors that underlie the dataset.

This study uses Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy to test for whether data is suitable for factor analysis and whether there are any factors that underlie the data set. Specifically, the Bartlett's test of sphericity tests whether the variables intercorrelate by comparing the observed correlation matrix in the data and an identity matrix (matrix where correlation is zero), while, the KMO tests for the factorability of the dataset (Schulz & Watkins, 2007).

The study undertook an Exploratory Factor Analysis (EFA) for purposes of establishing the number of factors that underlie the dataset. The scree plot and the Kaiser Criterion are the two analytical approaches used to establish the number of factors that underlie the dataset. Kaiser Criterion suggests that only factors with Eigen values above 1 should be selected. On the other hand, a Scree Plot is the graphical representation of the various factors against their respective Eigen values. Using the Scree Plot, the number of factors to retain are those up to a point at which the Scree Plot curve changes slope by becoming more horizontal (Hayton et al., 2004).

Even after establishing the optimal number of factors that underlie the dataset, it remains quite difficult to interpret the extracted factor matrix given that some question items not be absolutely unidimensional. This would require rotation to constrain each question item to only one underlying factor. The Varimax rotation method is adopted for its ability to produce simple to interpret factor matrices and the assumption that factors are uncorrelated (Abdi, 2003).

A confirmatory factor analysis (CFA) followed the EFA to validate and estimate the relationships hypothesized in conceptual model. The CFA is as well informed by the results of the EFA and it either confirms or refutes the results of the EFA.

6.4 The Sample Size

For a research project, sampling approach used relies a lot on the scope of available resources to the research. For this research study, a non-probability based sampling technique has been used. In this approach, participants were the ones that responded to the questionnaire request with their own choice of time and will. Selection of this method was done as implementation is easy of this technique and it also takes little time compared to other more-selective methods.

In this research, IT professionals in Saudi Government Overseas Agencies are selected for participation as they are easier to contact while also being part of the organization decision making process.

For analysis of the data collected, a SEM (structural equation modelling) method will be used. It is argued by Kline (2011) that for a research that utilizes SEM, a common sample size is usually minimum 200. It is also argued by others that the minimum sample population for a research can even have 15 responses for each variable evaluated, 10 responses on questions, and even 5 total participants. However, Stevens (2002) makes the suggestion that for useful implementation of SEM, there should be about 20 participants for each variable. As different researchers on use of SEM have no universal agreement on an optimum sample size and there is no agreed-upon size of a sample population. Based on such studies, a sample population of 200 and more participants is considered an effective sample size to develop a reliable study. Keeping this in consideration, this research has obtain 226 completed questionnaires from IT professionals as participants for this study.

6.5 Missing Data

Many research studies face the issue of missing data as it is a general part of any type of data collection method. Prior to conducting a method of data collection using statistical type of data, it is important to make certain that all data is complete According to Kline (2011), in some cases of SEM method can fail to produce reliable results through analysis if these exists an extent of missing data in data collection process. This happens with SEM, as the technique makes an assumption that data provided is error-free.

6.6 Goodness of Instrument

Prior to and upon conclusion of the data collection process, it was important to validate the tool used for data collection. For the purpose of increasing the overall accuracy of the study, it is also important to validate the reliability aspect of data collection process. It is always advised that this

is done before the main survey. For a research study, checking for accuracy of data and validity of the data collection method is important for reliable results (Sekaran, 2003).

In case of this study, validity of the data collection was done prior to and after collecting data. Furthermore, reliability of the study was also evaluated after completing the method of data collection.

6.7 The Validity of the Instrument

To make sure that the questions in survey method are evaluating the variables and factors needed to evaluate, it is important to perform validity of the instrument (Pallant, 2011). Using a validated instrument provides the knowledge that the data and data analysis results provide a real representation of the present situation. The instrument utilized in this study, makes use of two different measures of validation, which include- construct test and content test.

6.8 Content Validity

Content validity is a technique of ensuring that the content used in a data collection instrument makes use of right content for the research study. It should get implemented in the process of designing the questionnaire and before data is collected (Litwin, 2003). This process is used to validate the instrument that ensures that all appropriate content items are measured by the tool. It is not a good practice to make use of construct validity in absence of the content validity technique (Garver and Mentzer, 1999).

It is possible to achieve the goal of content validity by utilizing expert opinions and literature review (Straub et al., 2004). This research project makes use of both expert advice and literature review to validate the content. It is indicated by Straub et al. (2004) that using questions that are already validated by existing literature is better than constructing new questions for same purpose. Keeping this into consideration, the question statements used in this study were taken primarily from existing literature and this has been well acknowledged and referenced in the study.

In later stage, additional validity of the instrument was required. Therefore, advice was taken from ten experts in questionnaire design process for the purpose of this study. It is suggested by Lynn (1986) that a study should use advice from at-least five experts. The experts contacted for this study were primarily researches working for UK based universities and out of the ten experts, four are bilingual in both English and Arabic, which helped in validity of translated questionnaire. For the purpose of content validity process, the researchers were communicated with individually for their opinion and advice on the data collection instrument. Some changes were made to the

questionnaire based on expert advice for higher effectiveness and clarity and the changes were mainly related to the grammatical framing of the questions and additions to make the questions more clear.

6.9 Construct Validity

The construct validity process is a way of establishing whether the instrument does measure the intended aspects of the study. (Henry,and Crawford, 2005) In use of SEM method of analysis, it is very important to evaluate the validity of the construct. For this purpose, different methods including nomological validity, discriminating validity, and convergent validity were used.

6.10 Assessing Reliability of the Data Collection Instrument

Performing a reliability test is a very useful method in ensuring that a research instrument is accurate (Sekaran and Bougie, 2010).

It becomes more important to perform reliability test in cases where each construct in the instrument addresses numerous items, as a way of making sure that there is internal consistency (Pallant, 2013). It is also vital to conduct a reliability test with survey methods that make use of Likert scale for questions. Two different methods of reliability testing are most commonly used-test-retest reliability and internal consistency test. The test-retest consistency method analyses reliability by checking results with a re-test of same instrument. In the internal consistency test, it is checked whether or not the results of the instrument are consistent over time. In this process, conducting the survey with the same group of people in two different scenarios will provide knowledge about the reliability of the test.

For the purpose of this research, method of internal consistency test was used as a way of evaluating reliability. One commonly used method to test internal consistency is Alpha model as given by Cronbach. Cronbach's alpha is a process that combined with use of SPSS software that is used to check reliability in this study. This method assess the effectiveness in internal consistency on a fixed set of items that are linked to a construct. The outcome of this method is information about average correlation across different items that are present in same construct. Thee value for correlation in this method stays between 0 and 1. The closer a value is to 1, the higher the level of consistency and reliability is in a research. In common practice, a value above 0.8 in Cronbach's alpha is considered good for consistency while value between 0.6 and 0.7 is considered acceptable result (Robinson et al., 1991; Sekaran, 2003; Field, 2009).

In case of this research project, Cronbach's Alpha is used to evaluate reliability of the instrument after the data collection process is completed and the outcomes are presented in chapter 7 – data analysis. In addition to this, the reliability is tested for the stage that uses SEM-based analysis. Construct (composite) reliability is also estimated establish the reliability of the SEM constructs.

6.10.1 Data Analysis Procedure

The objective of implementing statistical assessment to assess the implications of cloud computing adoption model proposed earlier. In this section, the procedure of data analysis is detailed.

6.10.2 Preliminary Analysis of the Data

Before performing statistical analyses, it is vital to make sure that data is checked for errors such as outliers and abnormal distribution among others.(Kline, 2011). This assessment is very important to get more accurate and reliable results. This becomes more important knowing that SEM model works under assumption that supplied data is error-free. Keeping this into consideration, SPSS software is used in this process on the data collected to check if some data is missing. SPSS is then used for the purpose of assessing the demographic data and scope of the industry trends. At this same stage, instrument reliability is also validated by use of the Cronbach's alpha method combined with SPSS.

6.11 Structural Equation Modeling (SEM)

The technique of SEM refers to a popular technique of statistical assessment that allows testing of inter-relationships between different variables (Hoyle, 1995; Pallant, 2001). The primary reason behind data collection in this study was to assess the proposed model as shown in figure 5-1, and to validate the hypotheses about relationship between variables. In this manner, the SEM method allows comparing the theoretical model with the data collected. In essence, SEM technique combines theory with the data of real industry use. Due to all of these reasons, SEM appears to be the most useful and suitable technique to test the cloud adoption model.

In theory, the factors relating to the cloud adoption model are not measurable directly. In the SEM technique, construct variables (latent variable) refers to all factors of the model that are measurable by direct means, also called unobservable factors. However, it is possible to assess value of these factors using indirect assessment means that are measurable, known as indicator factors. In case of this study, the intention of the cloud service and all cloud adoption model factors were considered as factors/latent variables. SEM method gets used for statistical analysis to check the relationship between latent variables and indicator variables using path graphs. An advantage

presented by use of SEM technique is the ability to measure a latent variable using multiple measurement variables.

Both measurement and structural models are estimated. In the structural model, the relationships between the various latent variables are examined. This analysis is key given that SEM assumes the presence of relationships between factors within the dataset. Further, the structural model was estimated to validate the hypotheses of the study. On the other hand, the measurement model was estimated for the relationships between each latent variable and the measurement variables that are believed to measure it. AMOS software (Analysis Moment of Structures) was used to build and analyse structural equation models.

This decision was primarily made due to popularity of the software and readily availability of the software. In the following chapter, detailed explanation of the structural model and measurement model will be performed.

6.12 Ethical Approval

Before conducting distributing the survey to participants, an ethical approval form was submitted to the Ethics Research Governance Online (ERGO) committee at University to obtain approval. The reference number for ethical approval is 27577 and approved by the Ethics committee.

6.13 Summary

In this chapter of the research study, different methods that have been used for the purpose of evaluating the proposed cloud adoption model have been discussed in detail. It was identified that the questionnaire survey method of data collection is suitable for this study and it adequately allows testing of the research hypothesis and cloud adoption model. For the survey method, a sample population size of over 200 is considered sufficient. The method of developing the questionnaire and research design have also been discussed in-detail in this chapter. The questions for the survey method were first developed in English and then translated into Arabic with caution to retain the meaning and intent of the questions. It is important to gain results from this study that are accurate and to achieve that, the data analysis instrument should be reliable and validated. For this reason, the test tools used in order to evaluate the reliability and validity aspects have been detailed in this chapter. Use of a content validation test and construct validation test is performed to ensure reliability of the study. As a way of making sure that the questions are achieving the goal set for the questionnaire method, content validation test is performed prior to data collection process. Once the data is collected, construct validation test was performed. Cronbach's alpha method is used on the data collected for reliability check, along with use of SEM technique to

validate the composite validity. The way analysis of the data collected is done is also discussed in this chapter.

A data analysis and results follows in the next chapter.

Chapter 7 Data Analysis and Results

This chapter presents data analysis including Structural Equation Modelling (SEM) that was carried out on the data obtained from 226 participants through a Cloud Adoption Instrument. This analysis aims at answering the main research question: "What are the key factors that influence the adoption of cloud computing at Saudi Government agencies overseas?" by estimating the relationships between measured variables and factors as laid out in the conceptual framework.

The following sections present preliminary analysis of the survey data and an introduction to the technology adoption instrument that was developed and validated as reported in the earlier chapters. Thus, this chapter included data analysis comprising respondents' characteristics, reduction of data dimensions using the Exploratory Factor Analysis (EFA) as well as the Confirmatory Factor Analysis (CFA) and SEM, which were applied to measure how the measurement variables represented the underlying latent constructs (factors).

In the next section, researcher reports how the measurement models for each latent factor (construct) were developed and tested. In the final section, the SEM model is presented that investigates the relationships between the latent constructs, how these were developed, analysed, tested and finally SEM results are interpreted. Two software programmes, SPSS and AMOS were used for the data analysis.

7.1 Preliminary Analysis of the Data

In this section, basic descriptive statistics about the participants are reported, along with the reliability of the entire survey questionnaire. In addition, item evaluation and analysis is done in the preliminary analysis to verify whether they conform to the psychometric properties of the survey items as illustrated by Kline (1994). To illustrate, items to constitute the factors need to exhibit psychometric properties such as full scale usage for each item and appropriate skewness. Also, items must be internally consistent in measuring the factors. Item consistency is estimated using the Cronbach (1951) Alpha. Generally, according to Kline (1994), to measure a factor a good item should have a wider range value (difference between maximum scale value and minimum scale value) and normally distributed or symmetrical with kurtosis statistics less than 2 and skewness statistics less than 1. Further, according to Schulz and Watkins (2007), any individual item that if excluded from the estimation would lead to improvement in the alpha (α) value is suspect and most likely not a suitable measure of the underlying factor / construct.

7.1.1 Missing data

Most importantly, before any data analysis is undertaken, it is imperative to investigate missing data. SEM is said to be highly sensitive to missing data (Allison, 2003). An online link to cloud adoption questionnaire tool was sent to a total of 226 respondents and fortunately all of them accessed the link. All questions were mandatory and were answered by the respondents to completion.

7.1.2 Demographic and Institutional Information

A total of 226 persons responded to the study. The survey was conducted in different Saudi Organisations operating overseas in different service fields (Figure 7-1).

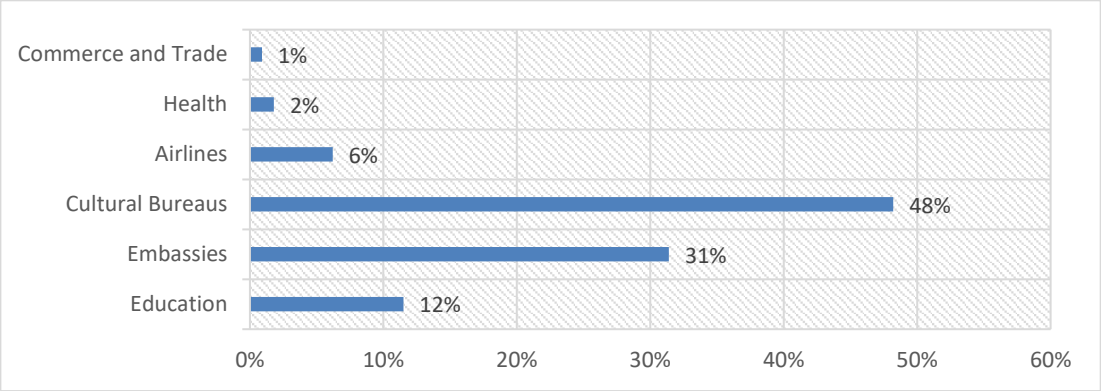

Figure 7-1 Distribution of respondents by organisation

The majority of the respondents came from cultural bureaus (48%) while 31% were from embassies. Very few (1%) reported to be from commerce and trade and health (2%), while only 6% and 12% came from Airlines and Education organisations respectively (Figure 7-1).

Results regarding one of the questions which required respondents to indicate the number of years of experience they have in the area of IT are shown in Figure 7-2.

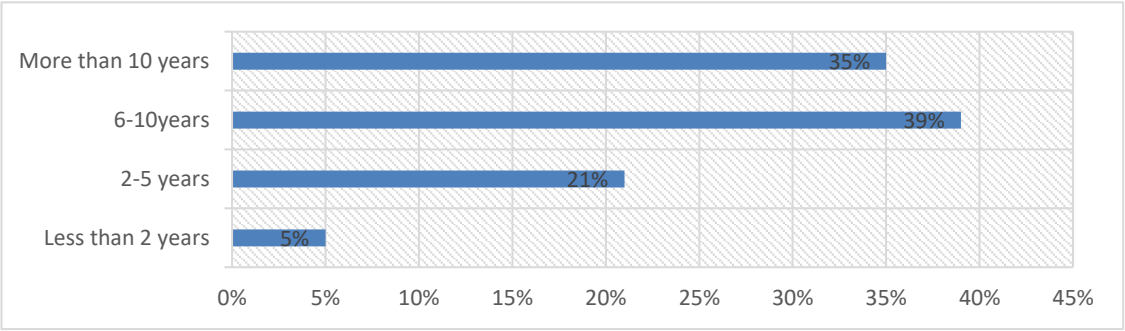

Figure 7-2 Distribution of respondents by IT work experience

Figure 7-2 indicates that the majority of respondents had 6-10 years of IT experience (39%), while 35% have above 10 years of experience. Only 5% had less than 2 years of experience while 21% had 2-5 years of experience. It is therefore clear that majority (74%) of the total respondents had IT experience of above 6 years of experience.

A further question of whether participants had ever worked on a government IT project was asked. As seen from Figure 7-3, almost all of the respondents (90%) had worked on a government IT project with only 10% indicating that they had never.

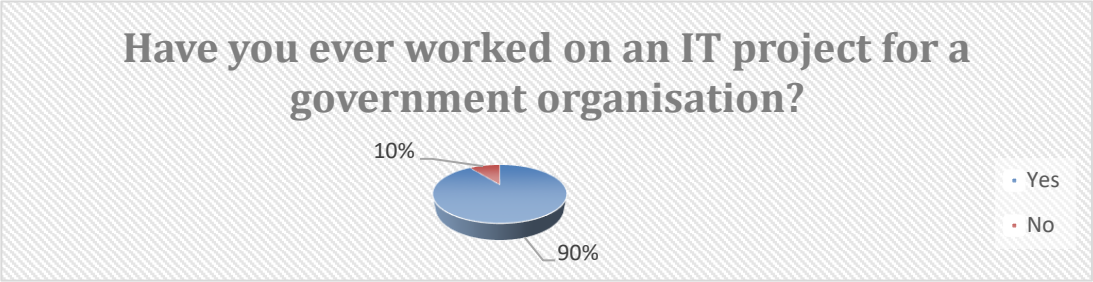

Figure 7-3: Ever worked on Government IT project

In addition, it was of interest to this study to establish the level of penetration of cloud computing in the organisations from which the participants came and the results are shown in Figure 7-4

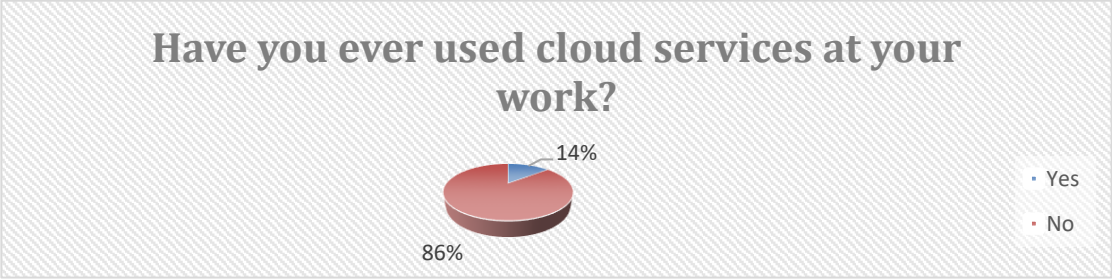

Figure 7-4: Ever used cloud

Results showed that very few (14%) of the respondents had ever used cloud services at their workplace while the majority (86%) indicated that they had never used it (Figure 7-4).

It can therefore be concluded that while majority of the respondents had been engaged in a government IT projects, very few had used cloud services at their workplace. This therefore points to a limited proliferation of cloud services in the participants' organisations.

The demographic and institutional information presents conflicting picture. Foremost, it shows that majority of the participants were highly experienced in an IT area and that majority had worked on a government IT project. Ironically, it was found that majority had never used cloud computing. This implies limited penetration of cloud computing in KSA agencies even when they employ very experienced workers in IT field.

7.1.3. **Question items' evaluation and analysis**

Items to constitute the factors need to conform to psychometric properties as illustrated by Kline (1994) such as full scale usage for each item and with items having normally distributed response patterns. Also, items must be internally consistent in measuring the factors. Item consistency is estimated using the Cronbach (1951) Alpha. Generally, according to Kline (1994), a good item to measure a factor should have a wider range value (difference between maximum scale value and minimum scale value) and be normally distributed or symmetrical with kurtosis figure less than 2 and skewness less than 1. Basically, Kurtosis is associated with the shape of the frequency distribution curve and it measures the distribution of data around the mean. Further, according to Schulz and Watkins (2007), any individual item that if excluded from the estimation would lead to improvement in the alpha value is suspect and most likely not a suitable measure of the underlying factor.

Verification of the above properties requires first screening the data using descriptive statistics for every item in the dataset, and item total statistics. From the item descriptive statistics (see appendix L), the minimum and maximum response values show that most of the items' scales were fully utilised by the respondents. For instance, for most of the items, the minimum response value is 1 or 2 and the maximum value is 5. This reflects good and full scale usage. With regards to the distribution of the responses for each item, all items have Kurtosis value of less than 2 apart from only two items which had their Kurtosis slightly above the recommended threshold, and these are:

-QQ4: Have you ever used cloud services at your work?

-Q22: Before the final implementation of cloud services, it is essential to try current extendibility of Apps to cloud to monitor their progress and effectiveness?

Further, with regards to skewness, almost all items responses are appropriately distributed with their skewness values within the recommended range of 0 and <1. Responses for only two (2) items are not normally distributed with skewness values above the recommended value of 1. These include:

-QQ4: Have you ever used cloud services at your work?

-Q22: Before the final implementation of cloud services, it is essential to try current extendibility of Apps to cloud to monitor their progress and effectiveness?

Therefore, based on the scores for Kurtosis and Skewness (see appendix L), we can conclude that the responses to items of this study are normally distributed but with just a few (two) that are not normally distributed. Other psychometric properties for the above two items whose responses are

not normally distributed shall be explored. For instance, it is will be of interest to establish whether the exclusion of each of the each of the two items improves the overall Cronbach Alpha or not.

7.2 Reliability of the Instrument

The responses to a survey tool are expected to be consistent in measuring the underlying construct(s). Cronbach Alpha (α) is used to measure internal consistency of items in representing the underlying constructs. The α for the overall questionnaire was estimated at 0.90 (Table 7-1) which is a good indication that all the items are highly consistent in measuring the underlying construct (Pallant, 2013).

Table 7-1: Overall Reliability statistics

Cronbach's Alpha	N of Items
0.90	69

The reliability of each of the 19 predictor latent constructs was assessed to establish the extent to which the various measurement items consistently represented the respective latent variables. Similarly, reliability for Cloud Adoption, which is the predicted latent construct was also estimated.

The latent factors have reliability values within the range of 0.54 as the lowest and 0.85 as the highest reliability value (Table 7-2). The most widely used cut-off for an acceptable Cronbach Alpha is 0.70 (George and Mallery, 2003). Nonetheless, there is not a universally acceptable cut-off point and according to the guidance provided from the early works by Nunnally (1967), the cut-off value for alpha should be taken on a case by case basis. Nunnally, advised that even alpha as low as 0.50 is appropriate for exploratory research.

In light of the above findings, 13 factors had their Cronbach Alpha of 0.70 and above Table7- 2. These factors included Organisation size; Legislation and Policy Concerns; Government Intervention; Usefulness of system; Culture of Saudi Gov't Agencies Overseas; Cloud Computing Adoption; Data Security; Culture of KSA; Employee Resistance; Internet Speed Reliability; Change Management Competences; Lack of IT Standards; Top Management Support; Privacy Service Quality (SQ); Vision of Organization; Trust; Extendibility of Application to the cloud; Cost of Infrastructure; and Employee Readiness (Table 7-2). On the other hand, 7 factors had their Cronbach Alpha below 0.70 but between 0.54 and 0.6. These factors included Privacy; Service Quality (SQ); Vision of Organization; Trust; Extendibility of Application to the cloud; Cost of Infrastructure; and Employee Readiness. These factors could be taken to be inconsistently measured.

There are 4 factors whose Alpha could improve if some poor measurement items were deleted, see **Table 7-3**. But the increase was not so big. For instance, the alpha for the service quality factor would raise from 0.63 to 0.64 if item Q3 was deleted. Similarly, alpha for the Vision of the Organisation factor would improve from 0.62 to 0.68 if question item Q29 is deleted. Further, alpha for the Cost of Infrastructure factor would improve from 0.59 to 0.62 if item Q44 was deleted. Finally, alpha for the Privacy factor would improve from 0.64 to 0.67 if question item Q48 was deleted.

It is worth noting that deleting questions Q3, Q29, Q44 and Q48 to lead to an acceptable improvement in Cronbach alphas for the four factors i.e. Service Quality, Vision of Organisation, Cost of Infrastructure, and Privacy.

Table 7-2 Summary of Reliability Analysis for all the factors.

Construct	Cronbach's alpha
Overall	0.90
Technological Factors	
Service Quality (SQ)	0.63
Lack of IT Standards	0.70
Usefulness of system	0.79
Data Security	0.73
Internet Speed Reliability	0.70
Extendibility of Application to the cloud	0.60
Organizational Factors	**Cronbach's alpha**
Employee Readiness	0.54
Vision of Organization	0.62
Top Management Support	0.70
Culture of Saudi Gov't Agencies Overseas	0.78
Change Management Competences	0.70
Cost of Infrastructure	0.60
Trust	0.62
Privacy	0.64
Employee Resistance	0.71
Organization size	0.85
Environmental Factors	
Legislation and Policy Concerns	0.82
Government Intervention	0.79
Culture of KSA	0.72
Intention to Adopt Cloud	
Cloud Computing Adoption	0.75

Table 7-3 Reliability Analysis for the factors whose alpha would improve on exclusion of some items.

Construct	Cronbach's alpha	Cronbach's alpha value if item deleted
Technological Factors		
Service Quality (SQ)	0.63	0.641(ItemQ3)

Construct	Cronbach's alpha	Cronbach's alpha value if item deleted
Organizational Factors		
Vision of Organization	0.62	0.680 (ItemQ29)
Cost of Infrastructure	0.60	0.615(ItemQ44)
Privacy	0.64	0.665(ItemQ48)

7.3 Descriptive statistics of key variables

It is clear that items measuring 16 factors were all in the agreement zone (mean>3 out of 5) (see appendix L). This is also reflected in the aggregated means of the 16 factors which are above 3 on a 5 options Likert scale. The variables with higher mean scores were measuring the following factors: Service Quality; Lack of IT Standards; Usefulness of System; Data Security; Extendibility of Application to the cloud; Employee Readiness; Vision of Organisation; Top Management Support; Culture of Saudi Gov't Agencies Overseas; Change Management Competences; Cost of Infrastructure; Privacy; Employee Resistance; Organization size; Government Intervention; Culture of KSA; and Cloud Computing Adoption.

The basic descriptive statistics therefore imply that respondents were agreeable to most of the measurement variables for the aforementioned factors, meaning that the above factors were perceived as being important to adopting Cloud Computing. Assuming the size of the mean score represents the level of importance that participants attached to the factors, the Employee Resistance factor would be taken to be the most important (Mean=4.3;SD=0.6). On the other hand, variables measuring three (3) factors including Internet Speed Reliability; Trust and Legislation and Policy Concerns had negative responses with participants disagreeing with the statements measuring the factors. For instance, the aggregate mean scores for Internet Speed Reliability, Trust, and Legislation and Policy Concerns are 2.6, 2.5 and 2.9 respectively. These low mean scores imply that participants disagreed with the fact that these three factors were important in deciding to adopt Cloud Computing.

It is critical to note that caution needs to be taken while interpreting results obtained in the descriptive statistics. It is not advisable to make any statistical inferences based on such statistics. Rather, descriptive statistics tries to hint on what the results in the final analyses could be. To this end, no conclusions will be derived from basic statistics.

7.4 Correlations between factors

Correlations between factors of the study were investigated and appendix M highlights that majority of the factors are correlated with each other. Correlation coefficients were generated on request in the AMOS software programme during the estimation of the structural equations.

Stronger correlations are noticed between lack of IT standards (LITS) and change management competences (CM); employee resistance and usefulness of system; size of the organisation and usefulness of system; and size of the organisation and employee resistance. Bearing in mind that presence of correlations amongst factors is one of the preconditions to undertaking factor analysis (see Kline, 1994), this finding suggests that the data could be adequate for performing factor analysis. Further tests such as Bartlett's Test of Sphericity are to be undertaken later on to reinforce the earlier preliminary finding that majority of the factors in the dataset are correlated.

7.5 Factor Analysis

Factor analysis technique is used as a data reduction method to establish the least number of latent constructs (factors) that explain the greatest variance in the dataset. It is critical to note that the virtue of parsimony is a key in conducting factor analysis such that only a few factors that explain a greater proportion of variance in the data are selected. Parsimony requires that we use fewer variables that could explain greater variance in the outcome variable than adding more variables in the model that explain less variance (Hair et al., 2010). The factor analysis technique groups various individual question items or measured variables that share variance (common variance) into the same group to measure an underlying construct that cannot be directly observed. By grouping the various measurement items into clusters presumed to be measured by an underlying construct (factor), it makes it easier to interpret and understand the dataset. (Brown, T.A., 2014).

7.5.1 Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) technique is used in this study to identify the possible number of factors that could be present in the dataset. This technique is not informed by the conceptual model arising out of the literature review. Rather, the factors arising out of an EFA are based on the existing relationships between the measured variables (question items) and the underlying constructs within the dataset. This therefore implies that there is a possibility for EFA analysis to suggest a number of underlying factors which may not be the same as those predetermined in conceptual model. It is critical to note that before factor analysis can be conducted, specific tests need to be undertaken to establish whether the dataset and sample are adequate for the purpose. The Bartlett's Test of sphericity and the Kaiser Meyer Olkin (KMO) measure of sampling adequacy are undertaken. According to Kline (1994), a Bartlett's Test score of <0.05 and a KMO score of >0.5 show data and sample adequacy, implying that such data is suitable for factor analysis. These two tests have been performed and the results reported in table 7-4:

Table 7-4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.90**
Bartlett's Test of Sphericity	Approx. Chi-Square	9551.77
	df	2415.0
	Sig.	<0.001

Table 7-4 indicates that the KMO is far above 0.5, and the Bartlett's Test of sphericity is significant [$X^2(2415) = 9551.7, P<0.001$]. These two tests imply that the dataset is adequate for the factor analysis. In the next section, EFA is undertaken to identify the number of factors that underlie the dataset.

7.5.2 Number of factors that explain the greatest variance in the dataset

The EFA analysis indicates that the data set is measured by 20 underlying constructs (see appendix K). The analysis also indicates that the 20 factors explain 72% of the variance in the dataset and each individual factor has an Eigen value greater than 1. An Eigen value for a given factor is a measure of variance of all measurement variables measured by the factor.

7.5.3 Factor Extraction

One of the analytical approaches to determining the number of factors to be extracted is given by the Kaiser Criterion (Williams, B., Onsman, A. and Brown, T., 2010) which suggests that only factors with Eigen values above 1 should be selected. Based on this criterion, all the 20 factors would qualify to be extracted given that they all have Eigen values greater than 1. It is however advised to always use the Scree Plot test besides the Kaiser Criterion to select the most appropriate number of factors. A Scree Plot is the graphical representation of the various factors against their respective Eigen values. Using the Scree Plot, the number of factors to retain are those up to a point at which the Scree Plot curve changes slope by becoming more horizontal.

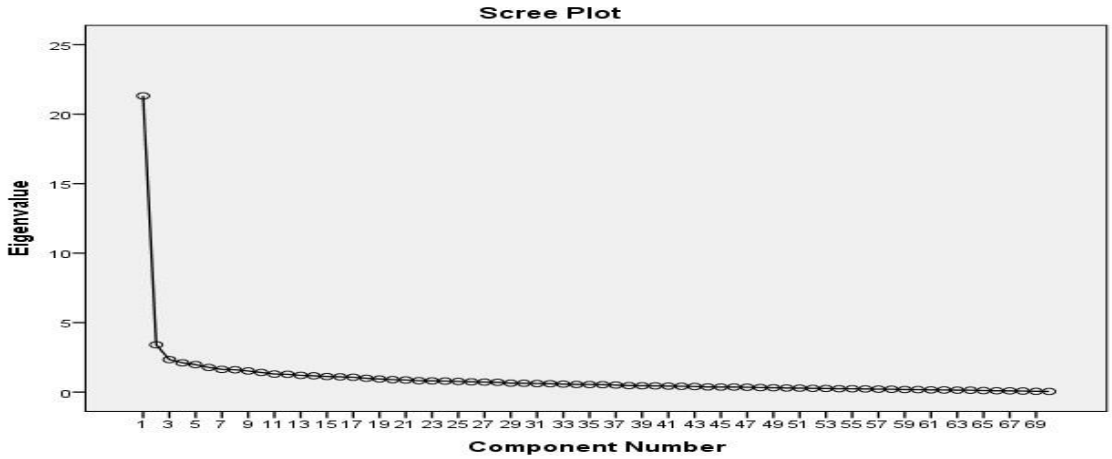

Figure 7-5: The scree plot with suggested number of factors that underlie the dataset

From the scree plot, there are four broad factors could be selected given that the curve become more flat after the fourth factor. In alignment with the conceptual framework, this dataset manifests majorly four broad dimensions. A Principal Components Analysis (PCA) is used to extract the four factors from the dataset. PCA is said to be one of the most appropriate data reduction methods used in factor analysis (Costello & Osborne, 2005).

7.5.4 Factor Rotation

Even after establishing the optimal number of factors that underlie the dataset, it remains quite difficult to interpret the extracted factor matrix given that some question items not be absolutely unidimensional which would require rotation to constrain each question item to only one underlying factor. The Varimax rotation method is adopted for its ability to produce simple to interpret factor matrices and the assumption that factors are uncorrelated.

7.5.5 Analysis of the four broad components extracted

- **Broad Component 1**

It is clear from the factor matrix that most of the items relating to Technology are grouped under component 1. Therefore component 1 is named Technology Factor (see Table 7-5). In the Conceptual Framework arising out of the literature review, it was anticipated that 23 question items would constitute the Technology Factor. However, the rotated matrix indicates that some question items cross-load, an indicator that these items measure more than one dimension (multi-dimensional). Nonetheless, even in instances of cross-loading, measurement items for technology category have higher loadings on the Technology category compared to others. To this end, these items were left under technology category.

Table 7-5: Variables measuring Technology Factor

Sub-Dimensions	Label	Variable Items	Factor Loadings
Service Quality	Q1	Cloud services must work accurately to ensure effective running of our systems operations.	0.76
	Q2	Equipping our systems with high quality service would encourage us to strive ahead for the usage of cloud computing.	0.71
	Q3	Cloud computing service enables all the time service accessibility (24/7).	0.48
	Q4	Cloud computing service also enables easily accessibility through the usage of service anywhere.	0.67
	Q5	An efficient backup service would definitely regard us to switch to cloud service.	0.65
	Q6	Lack of IT Standards is a major barrier in cloud services adoption.	0.70

Sub-Dimensions	Label	Variable Items	Factor Loadings
Lack of IT standards	Q7	Lack of IT Standards negatively affects the decision to adopt cloud services.	0.66
	Q8	IT standardisation will facilitate cloud computing adoption.	0.69
	Q9	Lack of IT standards make cloud computing problematic to use.	0.77
Usefulness of system	Q10	Should consider the usefulness of the system when adopting cloud computing	0.84
	Q11	Accelerate the adoption of cloud within my organisation depends on Usefulness of Cloud Computing service.	0.85
	Q12	Usefulness of Cloud Computing allows users access to the same kinds of applications through the internet	0.86
Data Security	Q13	Database in cloud computing service not secure enough to store our agencies data.	0.79
	Q14	Traditional data base methods are more secure than cloud service.	0.75
	Q15	One of the main reasons to discourage our decision of using cloud technology is security.	0.69
	Q16	Benefits of cloud service less than risks.	0.74
Internet Speed Reliability	Q17	Before the application of cloud computing, it is necessary to test the internet connectivity for speed and reliability.	0.73
	Q18	High Internet speed will encourage adoption of cloud service in my organisation	0.83
	Q19	Cloud computing configurations should comply with high internet speed.	0.69
Extendibility of Application to the Cloud	Q20	Extendibility of Apps is a critical factor for the adoption of cloud services.	0.71
	Q21	Knowing how to deal with current Apps is critical before deciding to adopt cloud computing.	0.69
	Q22	Before the final implementation of cloud services, it is essential to try current extendibility of Apps to cloud to monitor their progress and effectiveness.	0.54
	Q23	I would definitely go for the idea of cloud computing if it is actively applicable with most of our Apps.	0.73

- **Broad Component 2**

The rotated matrix indicates that most of the items loading on this component relate to the Environment and this component is named Environmental Factor. In the Conceptual Framework, it was anticipated that 9 variables measure the Environmental Factor. This was confirmed by the analysis given that all the anticipated variables are grouped together as highlighted in table 7-6 below:

***Table 7-6**: Variables measuring Environmental Factor*

Sub-dimensions	Label	Variable Items	Factor Loadings
Legislation and Policy Concerns	Q58	Legislation with complex policy affects our decision to use cloud services.	0.84
	Q59	Legislation and policy concerns are critical issues that affect our decision to use cloud services.	0.80
	Q60	Once our policy and legislation has been properly debated the organisation will adopt cloud service.	0.65

Sub-dimensions	Label	Variable Items	Factor Loadings
Government Interventions	Q61	The government may sometimes intervene in government organisations to make a decision whether or not to adopt the cloud service.	0.85
	Q62	Government intervention affects our decision to use cloud services.	0.83
	Q63	Government intervention has high impact on government organisation's decision to cloud computing adoption.	0.84
Culture of KSA	Q64	Another factor that would enable me to use the cloud computing is if the server providers were based in Saudi Arabia.	0.81
	Q65	Cloud computing could be responsible for IT employees reduction in my agencies, while, Saudi Arabia needs to encourage local IT employment.	0.85
	Q66	The national culture has an important impact on change management and management decisions on adopting cloud computing services	0.74

- **Broad Component 3**

The rotated matrix indicates that most of the variables grouped under component 3 relate to the Organisation hence this component is named Organisation Factor. In the Conceptual Framework, it was anticipated that this factor would be measured by 34 variable items. Whereas some items on this component cross-load, they do load more on organisational related factors. (See Table 7-7)

Table 7-7: Variables measuring Organisation Factor

Sub-dimensions	Label	Variable Items	Factor Loadings
Employee Readiness	Q24	Employee knowledge of cloud service is required to use Cloud computing	0.77
	Q25	Employee Readiness is one of the top challenges that many government organisations face when implementing the cloud services.	0.71
	Q26	Employee readiness is essential prior to decision to adopt cloud computing.	0.68
Vision of Organisation	Q27	It's important that my organisation have a vision to adopt cloud technology in the future.	0.80
	Q28	Vision of the organisation will help us to adopt cloud computing more quickly.	0.83
	Q29	It is necessary for our organisation to have a vision to know when we will adopt cloud computing.	0.73
Top Management Support	Q30	Involvement top management is necessary to adopt cloud service.	0.73
	Q31	Another factor that drives the ability of implementing cloud computing is the decision of the top management.	0.71
	Q32	Top management involvement is essential in decision making for cloud computing adoption.	0.11

Sub-dimensions	Label	Variable Items	Factor Loadings
	Q33	Top management involvement is in reviewing cloud computing recommendations by an expert consultant.	0.76
Culture of Saudi Agencies Overseas	Q34	In general, we like to try new technologies that facilitate work.	0.85
	Q35	My organisation faces some organisational culture barriers in relation to the adoption of modern technologies.	0.83
	Q36	Organisational culture will not affect my organisation in adopting the Cloud Computing technology.	0.82
Change Management Competences	Q37	Another important element to consider before the implementation of cloud computing is the adoption of change management competencies.	0.70
	Q38	The idea of implementing cloud services within my organisation is in direct relation with the adoption of change management competencies ability.	0.76
	Q39	Leaders have to achieve change management competencies in my organisation to adopt cloud computing.	0.68
	Q40	I would use cloud services if they complied with change management competencies between leadership in Saudi government organisations and government organisations overseas.	0.72
Cost of Infrastructure	Q41	Cost of IT Infrastructure is very important factor in adopting Cloud Computing	0.78
	Q42	Ensuring a good low cost IT infrastructure would encourage us to use cloud service.	0.67
	Q43	Cloud services have a low degree of costs involved in IT infrastructure, which could facilitate cloud computing adoption.	0.73
	Q44	Standardized IT infrastructure could help organizations to reduce cost by adopting Cloud computing.	0.46
Trust	Q45	I feel confident while I save my organisation's data on the cloud service.	0.83
	Q46	The data of my organisation could be accessed by third party without my knowledge.	0.78
	Q47	I feel assured that our data on the cloud will be protected due to adequate tech1logical regulations.	0.64
Privacy	Q48	Privacy issue is one that affects our decision to employ cloud computing.	0.48
	Q49	Our organisational data on the cloud maybe exposed to unauthorised parties without our knowledge.	0.75
	Q50	I would definitely encourage cloud computing within my organisation if our data was guaranteed.	0.76
	Q51	The cloud service providers might also be responsible for making our data available for other parties without our knowledge and permission.	0.75

Sub-dimensions	Label	Variable Items	Factor Loadings
Employee Resistance	Q52	Cloud computing adoption may be resisted by employees because they will lose some power in the organisation.	0.86
	Q53	Employee resistance negatively affects the decision for cloud computing adoption.	0.84
	Q54	Employees who resist change can severely oppose organisational decision to adopt cloud computing.	0.70
Organisation Size	Q55	The size of organisation is important when making the decision to adopt cloud.	0.84
	Q56	The size of my organisation affects decision to adopt cloud service	0.91
	Q57	Using cloud technology depends on the organisational size.	0.88

- **Broad Component 4**

The rotated matrix indicates that most of the items grouped under component 4 relate to Cloud Adoption. In the Conceptual Framework, it was anticipated that 4 measurement items would constitute this factor. However, the analysis indicated that one question [Have you ever used cloud services at your work] did not measure this factor and did not load on any other components (see Table 7-8).

Table 7-8: Variables measuring Cloud Adoption Factor

Sub-dimensions	Label	Variable Items	Factor Loadings
Cloud Computing Adoption	QQQ1	Overall, I think that using cloud computing services is advantageous	0.83
	QQQ2	Overall, I am in favour of using the cloud computing services	0.80
	QQQ3	I think that I would like to use the cloud computing frequently	0.81

7.6 Structural Equation Modelling (SEM)

This study uses the Structural Equation Modelling (SEM) technique to estimate the relationships between:

i) Measurement variables and Factors (Measurement Model)

ii) Factors and Factors (Structural Model)

The SEM is the most suitable and robust statistical technique to estimate the relationships anticipated given that the data structure entails observed (measured variables) and unobserved (latent) variables (Byrne,2016). Secondly, the SEM method gives more reliable estimations given that it estimates an error term for each and every measurement variable in the model (Benda and

Corwyn, 2000). This makes the SEM superior over Ordinary Least Square (OLS) Methods, which aggregate the error terms into one, making it impossible to estimate errors associated with each measurement variable (see Benda and Corwyn, 2000). This section presents the analysis of the structural equation models based on the conceptual framework derived from the literature. To estimate the SEM, the IMB AMOS software was used.

7.6.1 Analysis of the measurement model

This study adopts two level analysis levels. The Measurement model and the Structural model. The Measurement model estimates the relationships between the measurement variables and the respective latent construct. Nonetheless, before this analysis it was critical to assess the extent to which the measurement items reliably and validly represent the latent factor. This is most important because in this study each latent construct was measured by not less than 3 question items. To this end, in this study, 19 measurement models (for each of the 19 factors) were estimated plus one model for the Cloud Adoption factor. These factors were measured by 69 question items (measured items) mainly derived from the empirical literature and the researchers' own experience of the subject. The Table 7-9 below highlights the data structure of the current study.

Table 7-9: Latent Constructs and their indicators

Construct	Indicators (Measured Variables)
Technological Factors	
Service Quality (SQ)	Q1,Q2,Q3,Q5
Lack of IT Standards	Q6,Q7,Q8,Q9
Usefulness of system	Q10,Q11, Q12
Data Security	Q13,Q14,Q15,Q16
Internet Speed Reliability	Q17,Q18,Q19,
Extendibility of Application to the cloud	Q20,Q21,Q22,23
Organizational Factors	
Employee Readiness	Q24,Q25, Q26
Vision of Organization	Q27,Q28,Q29
Top Management Support	Q30,Q31,Q32,Q33
Culture of Saudi Gov't Agencies Overseas	Q34,Q35,Q36
Change Management Competences	Q37,Q38,Q39,Q40
Cost of Infrastructure	Q41,Q42,Q43,Q44
Trust	Q45,Q46,Q47
Privacy	Q48,Q49,Q50,Q51
Employee Resistance	Q52,Q53,Q54
Organization size	Q55,Q56,Q57

Construct	Indicators (Measured Variables)
Environmental Factors	
Legislation and Policy Concerns	Q58,Q59,Q60
Government Intervention	Q61,Q62,Q63
Culture of KSA	Q64,Q65,Q66
Intention to Adopt Cloud	
Cloud Computing Adoption	QQQ1,QQQ2,QQQ3

A model would be reliable if the measurement items are internally consistent in representing the factor and whether the items actually measure the factors (Stratford, 1989). Reliabilities and validity measures are used for these purposes, including Internal Reliability (IR), Composite Reliability (CR) and Construct Validity. Internal Reliability is computed using Cronbach Alpha while Composite Reliability is computed by estimating the proportion of total variance that is explained by the measurement variables. Construct Validity is measured using correlations between the measurement items that measure a particular latent construct (also known as convergent validity), and the degree of distinctiveness or unidimensionality of the measurement items in measuring the latent construct (also known as discriminant validity) (Slocum-Gori & Zumbo, 2011).

7.6.2 Composite Reliability (CR)

Composite reliability measures the proportion of total variance that is explained by the measurement variables (Hair et al. 2010). A higher value (usually 0.7) is taken to indicate an acceptable CR score (Hair et al. 2010). In SEM, composite reliability is important because it indicates the power of the chosen items to measure the latent construct or not (Gerbing & Anderson, 1988).

It is calculated as the quotient of variance explained by measurement items and the total variance using the following formula.

$$CR = \frac{(\Sigma\lambda)^2}{(\Sigma\lambda)^2 + \Sigma\varepsilon} \qquad \text{(Equation 1)}$$

Where CR is composite Reliability

$(\Sigma\lambda)^2$ is total of factor loadings squared

$\Sigma\varepsilon$ is the sum of error variance associated with each factor loading.

Table 7-10: Constructs and their Critical Ratios

Construct	CR
Service Quality (SQ)	0.79
Lack of IT Standards	0.8
Usefulness of system	0.88
Data Security	0.83
Internet Speed Reliability	0.8
Extendibility of Application to the cloud	0.76
Employee Readiness	0.77
Vision of Organization	0.8
Top Management Support	0.69
Culture of Saudi Gov't Agencies Overseas	0.87
Change Management Competences	0.81
Cost of Infrastructure	0.76
Trust	0.8
Privacy	0.85
Employee Resistance	0.84
Organization size	0.91
Legislation and Policy Concerns	0.81
Government Intervention	0.88
Culture of KSA	0.84
Cloud Computing Adoption	0.74

From the Table 7-10 above, 19 out of the 20 constructs showed a composite reliability value above 0.7 implying that the measurement variables explain a greater proportion of the variance of their respective latent variables. Nonetheless, only one construct i.e., Top Management Support had CR below 0.7 but it was close to the cut-off mark. It can therefore be concluded that the measurement items reliably represent the respective latent constructs that they measure in this study.

7.6.3 Convergent validity

The researcher used the Average Variance Extracted (AVE) to measure the convergent validity. AVE is the average loading that each measurement item would load on a respective latent variable. It was estimated using the following formula suggested by Fornell & Larcker (1981)

$$AVE = \frac{(\Sigma\lambda^2)}{N} \quad \text{(Equation 2)}$$

Where $\Sigma\lambda^2$ is the summed square of factor loadings and N is the number of measurement items under the same latent construct. It is imperative to note that factor loadings range between -1 and +1 and the closer the loading towards 1, the better the convergent validity (Turel, Serenko & Bontis 2007). Nonetheless, there are no universally acceptable cut-off threshold for the AVE. Hair et al.

(2010) suggested that an AVE estimate of 0.5 and above would suffice for the convergent validity. The calculated AVE values per latent constructs (See appendix I).

Table 7-11 Constructs whose AVE can be improved by excluding some items

Construct	Factor loading	AVE	Items excluded	AVE after excluding Items
Service Quality (SQ)	0.76	0.44	Q3	0.5
Top Management Support		0.41	Q32	0.54
Cost of Infrastructure	0.67	0.45	Q44	0.53
Privacy	0.75	0.48	Q48	0.57

From Table 7-11, it is clear that most of the latent constructs had their AVE above 0.5. Nonetheless, estimated AVE for some factors, for example, Service Quality (SQ); Extendibility of Application to the cloud; Top Management Support; Cost of Infrastructure and privacy were below 0.5 implying that there is a low correlation between some of measurement items and their respective latent construct. Sometimes, measurement items that do not accurately measure the latent construct may be the cause for lower AVE and in most cases if such items with smaller loadings (less than 0.5) are dropped from further analyses and the AVE increases. Nonetheless, in some instances, exclusion of an item causes a very marginal effect on the AVE to the extent that the trade-off may not be justified.

In trying to improve AVE for the service quality factor, Q3 was excluded from the subsequent analysis and this caused marginal impact by increasing the corresponding AVE from 0.44 to 0.5, which is the threshold. Furthermore, in trying to improve AVE for the Top Management Support factor, item Q32 was excluded because it had a very small loading. This significantly increased AVE from 0.41 to 0.54. Similarly, when Items Q44 and Q48 were excluded in the subsequent estimation, the AVE for Cost of Infrastructure and Privacy increased from 0.45 to 0.53 and 0.48 to 0.57 for the Cost of Infrastructure and Privacy factors respectively. It is however critical to be aware that just because excluding an item from estimation improves AVE, care must be taken to have better informed reasons for excluding a measured item.

This therefore means that measurement items should not just be excluded from the study for the sake of it even when the software suggests. Exclusion of items should be informed by both theory and item behaviour within the dataset. It is for this reason that such items that had earlier been earmarked for exclusion were put back into the equation.

7.6.4 Discriminant Validity

One of the assumptions taken while conducting SEM and factor analysis is that the measurement items are unidimensional in nature (refer to Table 7-12). This expects question items to load on to

only one construct. In other words, an item should be able to discriminate on the possible relationships within the dataset and load strongly on only one underlying construct. This implies that there are no items loading on more than one latent constructs and that there should be no redundant items. Usually, discriminant validity is estimated by comparing the root of AVE and the square correlation between the constructs (Fornell and Larcker, 1981; Hair et al., 2010). This condition would be fulfilled if the AVE value for each construct is higher than the square correlation estimate between the constructs. This condition is held in almost all cases apart from in 4 instances where the correlation coefficients between factors were greater than the estimated AVE value. For instance, the correlation coefficient for the relationship between Change Management Competences (CM) and Lack of IT Standards is higher than AVE for CM. Similarly, the correlation estimates between usefulness of system (USE); and Employee Resistance and Organisation size are greater than their respective AVEs. This therefore implies that such variables do not discriminate well between constructs and are less reliably measured. This therefore means that in this particular research, respondents did not draw a boundary between change management and lack of IT standards, neither did they understand the differences between the measurement items for; usefulness of system (USE), employee resistance and organisation size. Most likely some items measuring the above factors seemed similar and were perceived as so by the respondents.

Table 7-12: Discriminant validity test of constructs

	QS	LITS	USE	DS	IS	Exapp	ER	VO	TMS	CSO	CM	COST	TRUST	PRIVACY	RESIST	SIZE	LPC	GOVT	CKSA
QS	0.44																		
LITS	0.34	0.50																	
USE	0.21	0.09	0.72																
DS	0.22	0.45	0.16	0.55															
IS	0.35	0.02	0.04	0.07	0.57														
Exapp	0.03	0.44	0.42	-0.40	0.36	0.45													
ER	0.18	0.01	0.50	0.48	0.01	0.13	0.52												
VO	0.52	0.45	0.04	0.16	0.05	0.11	0.23	0.57											
TMS	0.06	-0.23	0.20	0.40	0.21	0.11	0.30	0.19	0.41										
CSO	0.32	0.60	0.40	0.28	0.07	0.10	0.19	0.13	0.10	0.69									
CM	0.24	0.53	0.09	0.19	0.15	0.06	0.22	0.14	0.17	0.08	0.51								
COST	0.42	0.43	0.39	0.34	0.32	0.17	0.36	0.26	0.30	0.16	0.23	0.45							
TRUST	-0.13	-033	0.50	0.45	0.28	-0.04	-0.15	-0.08	-0.09	-0.04	-0.05	-0.15	0.57						
PRIVACY	0.35	0.02	0.17	0.39	0.10	0.06	0.15	0.09	0.13	0.09	0.10	0.20	-0.04	0.48					
RESIST	0.08	0.03	-0.55	-0.40	-0.01	-0.00	-0.02	-0.01	-0.01	0.14	-0.01	0.02	-0.02	0.01	0.48				
SIZE	-0.15	-0.08	0.78	-0.06	0.04	-0.01	-0.12	-0.02	0.00	-0.27	-0.02	0.30	0.04	- 0.01	- 0.86	0.77			
LPC	0.13	0.45	0.05	0.01	0.01	0.07	0.12	0.09	0.07	0.02	0.01	0.11	-0.06	0.04	- 0.03	0.04	0.59		
GOVT	0.23	0.34	-0.03	-0.60	0.08	0.15	0.30	0.26	0.27	0.08	0.17	0.37	-0.04	0.13	- 0.06	-0.01	0.13	0.71	
CKSA	0.43	0.56	- 0.02	-0.21	0.01	0.15	0.31	0.23	0.27	0.16	0.21	0.57	-0.08	0.16	- 0.01	-0.02	0.13	0.45	0.64

Notes:

1. *Values in the diagonal are the Average Variance Extracted (AVE) values*
2. *Values highlighted blue indicate violation of discriminant validity*
3. *The full names of the variables in the table above as follows: Service Quality (SQ); Lack of IT Standards (LITS); Usefulness of system(Use):Data Security (DS);Internet Speed Reliability(IS);Extendibility of Application to the cloud (Exapp);Employee Readiness (ER);Vision of Organization(VO);Top Management Support(TMS); Culture of Saudi Gov't Agencies Overseas(CSO);Change ManagementCompetences(CM);CostofInfrastructure(Cost);Trust;Privacy;*

Employee Resistance(ER);Organization size(Size);Legislation and Policy Concerns(LPC);Government Intervention (Govt); Culture of KSA(CKSA).

7.6.5 Nomological validity

This is the validity that has to be backed up by empirical evidence. This was very much employed in deriving the conceptual framework. Using this kind of validity test, the relationships being tested should be logical and sensible and backed up by theory (Hair et al., 2010). This study will employ this validity test to evaluate whether the relationships hypothesised in the conceptual framework are supported by the data using the structural model.

7.7 Structural model Analysis

The above reliability analysis indicates that the measurement models involving the latent constructs and their measurement items are fairly reliable. The next step is therefore to estimate the structural equation model, which investigates the relationships between the latent variables. This analysis is informed by the conceptual framework see (Figure 5-1):

These hypotheses are summarised in the Table 7.13 below:

Table 7-13: Hypothesised paths to be estimated in the structural model

Construct	Hypothesis	Relations
Quality Service (QS)	H1 (+)	QS → CCA
Lack of IT Standards (LITS)	H2 (-)	LITS → CCA
Usefulness of System (USE)	H3 (+)	USE → CCA
Data Security (DS)	H4 (+)	DS → CCA
Internet Speed (IS)	H5 (+)	IS → CCA
Extendibility of Application to the Cloud (EXapp)	H6 (+)	EXapp → CCA
Employee Readiness (ER)	H7 (+)	ER → CCA
Vision of Organization (VO)	H8 (+)	VO → CCA
Top Management Support (TMS)	H9 (+)	TMS → CCA
Culture of Saudi Government agencies overseas (CSO)	H10 (-)	CSO → CCA
Change Management (CM)	H11 (+)	CM → CCA
Cost of Infrastructure (Cost)	H12 (-)	Cost → CCA
Trust (Trust)	H13 (+)	Trust → CCA
Privacy (Privacy)	H14(+)	Privacy → CCA
Employee Resistance (Resist)	H15 (-)	Resist → CCA

Construct	Hypothesis	Relations
Organization Size (Size)	H16 (+)	Size → CCA
Legislation and Policy Concerns (LPC)	H17(-)	LPC → CCA
Government Intervention (Govt)	H18 (-)	Govt → CCA
Culture of KSA (CKSA)	H19 (-)	CKSA → CCA
Cloud Computing Adoption (CCA)		

The negatives and positives are based the hypotheses taken during the conceptualisation of the study. Therefore if it was hypothesised that factor A is positively associated with factor B, then a positive sign would be attached to the hypothesis. The same applies to the hypothesised negative relationship

7.8 SEM Model and Goodness of Fit Indices (GoF)

Structural equation models are based on a number of assumptions and one of the critical assumptions is that the model fits the dataset (Kline, 2012). This therefore entails a comparison between the observed data with the hypothetical perfect model. It is however imperative to note that the reality can never be the same as the hypothetical model and therefore there will always be differences anticipated between the data collected and the hypothetical model (Wandel,1985). Nonetheless, good fit arises when there is an insignificant difference between the two models.

A number of indices have been suggested in trying to establish the Goodness of Fit (GOF) in the SEM (see Table 7-14). These fit indices have been classified into different groups including the basic goodness of fit indices, the absolute goodness of fit indices, the incremental goodness of fit indices and the parsimonious goodness of fit indices (Hair et al., 2010).

One of the most basic GOF statistics is the Chi-square (χ^2), which helps to indicate whether the data fits the model by highlighting whether the difference between the two models are significant or not. A good fit requires that the Chi-square statistic is insignificant (P>.05). Nonetheless, the greatest disadvantage of using the Chi-square to test good fit is that it is highly sensitive to large sample numbers and in most cases, a significant result will always be expected whenever the sample is large (Kline, 2011). Therefore, this test indicator should never be relied on; rather, it should be complemented by other tests (Kline, 2011).

Popular among the absolute fit indices are the Goodness of fit index (GFI) and the Root Mean Square Error of Approximation (RMSEA). The GFI measures the level of covariance between the variables in the model and a higher GFI is required to show goodness of fit. Hooper (2008) indicates

that GFI value of ≥ 0.9 is acceptable. On the other hand, RMSEA measures the deviation between the observed and measured covariance and therefore, lower values are preferred for RMSEA (Hu and Bentler, 1999). Whereas there is no universally accepted cut-off value for RMSEA, Hair et al., (2010) guides that this should not be more than 0.07, particularly for bigger samples and with higher parameters to be estimated.

In the category of Incremental or comparative fit indices, the Normed fit index (NFI) and Comparative Fit Indices (CFI) are commonly used. Incremental fit indices measure the relative increase or improvement in model fitness caused by estimating a particular model using data available and higher values of NFI and CFI are preferred to indicate greater improvement (Byrne, 2010).

In the present study, the initial SEM model estimated was strictly constructed using the conceptual framework (Figure 5-1) and it was based on a sample of 226 respondents who answered an online questionnaire survey with 69 question items. The initial model does not assume factor covariance until there is evidence of the need to have factors co-vary. The initial SEM model showed a poor fit across all indices with the collected data. For instance, the initial model was associated with a Chi-square with a significant P-value; with a GFI of 0.45; and RMSEA of 0.103. All these indices are far from the recommended acceptable values. Therefore, it was clear that the initial structural model does not fit the given data.

Table 7-14 Obtained fit indices compared to the acceptable Goodness of Fit Indices

Fit Indices	Obtained value	Benchmark
chi-square	P<.05	P>.05
Absolute Fit Indices		
GFI	0.45	≥ 0.9
RMSEA	0.103	≤ 0.07
Incremental Fit Indices		
CFI	0.40	≥ 0.90
TLI	0.30	≥ 0.90 *

**Note: Benchmarks for the fit indices have been based on a summary of fit indices as suggested by various researchers including Byrne, 2010; Hair et al., 2010; and Kline, 2011.*

Further investigations using the modification indices indicated that improvement in the model can be attained by allowing covariance between latent factors. Theoretical rationale for instance, there were large modification indices associated with some relationships suggesting that the model would be improved if the following factors were allowed to correlate within the model (see Table 7-15):

Table 7-155 Modification indices

SUGGESTED MODIFICATIONS			Modification indices	Parameter change due to modification
LITS	<-->	CM	111.729	0.391
DS	<-->	TMS	128.271	0.376
COST	<-->	CKSA	136.547	0.386
USE	<-->	RESIST	75.881	0.443
SIZE	<-->	USE	37.446	0.31
RESIST	<-->	SIZE	69.787	0.38

This post-hoc modification improved the final SEM model fit (see Table 7-16).

Table 7-16 Final SEM model fit and the benchmark thresholds

Fit Indices	The Final Model Fit	Benchmark
chi-square	P<.05	>.05
Absolute Fit Indices		
GFI	0.976	≥ 0.9
RMSEA	0.049	≤0.7
Incremental Fit Indices		
CFI	0.935	≥ 0.90
TLI	0.870*	≥ 0.90

**Note: Whereas the acceptable TLI cut off is set at 0.9, some authors have used cut off as low as 0.80 since TLI tends to run lower than GFI particularly in complex models like the one adopted in this current study (Shadfar & Malekmohammadi, 2013).*

7.9 Assessment of Latent Variable Relationships

The relationships between latent constructs were estimated using path coefficients/regression coefficients (β) and p-values indicating the level of statistical significance (p) at 0.05 level for each of the coefficients. Table 7-10 presents the standardised regression coefficients. In addition, the critical ratios (CR), which are synonymous to the T-values, are reported in Table 7-17.

Table 7-17: The analysis of hypothesis paths

Hypotheses	Hypothesized paths		Findings		
			β (standardised)	C.R.	*P*
H1 (+)	QS	→CCA	0.184	2.616	0.009
H2 (-)	LITS	→CCA	-0.519	-7.617	<0.001
H3 (+)	USE	→CCA	0.449	7.048	<0.001
H4 (+)	DS	→CCA	0.678	8.441	<0.001
H5 (+)	IS	→CCA	0.014	0.215	0.829
H6 (+)	EXapp	→CCA	-0.186	-2.423	0.015
H7 (+)	ER	→CCA	0.26	2.398	0.016
H8 (+)	VO	→CCA	-0.083	-1.192	0.233

Hypotheses	Hypothesized paths		Findings		
H9 (+)	TMS	→CCA	0.7	8.484	<0.001
H10 (-)	CSO	→CCA	-0.08	-1.242	0.214
H11 (+)	CM	→CCA	-0.038	-0.153	0.879
H12 (-)	Cost	→CCA	0.479	3.89	0.001
H13 (+)	Trust	→CCA	0.58	3.84	0.001
H14(+)	Privacy	→CCA	0.362	3.22	0.001
H15 (-)	Resist	→CCA	-0.364	-2.411	0.016
H16 (+)	Size	→CCA	0.299	3.70	0.001
H17(-)	LPC	→C CA	-0.559	-6.375	0.001
H18 (-)	Govt	→CCA	-0.083	-6.436	0.001
H19 (-)	CKSA	→CCA	-0.689	-7.292	0.001

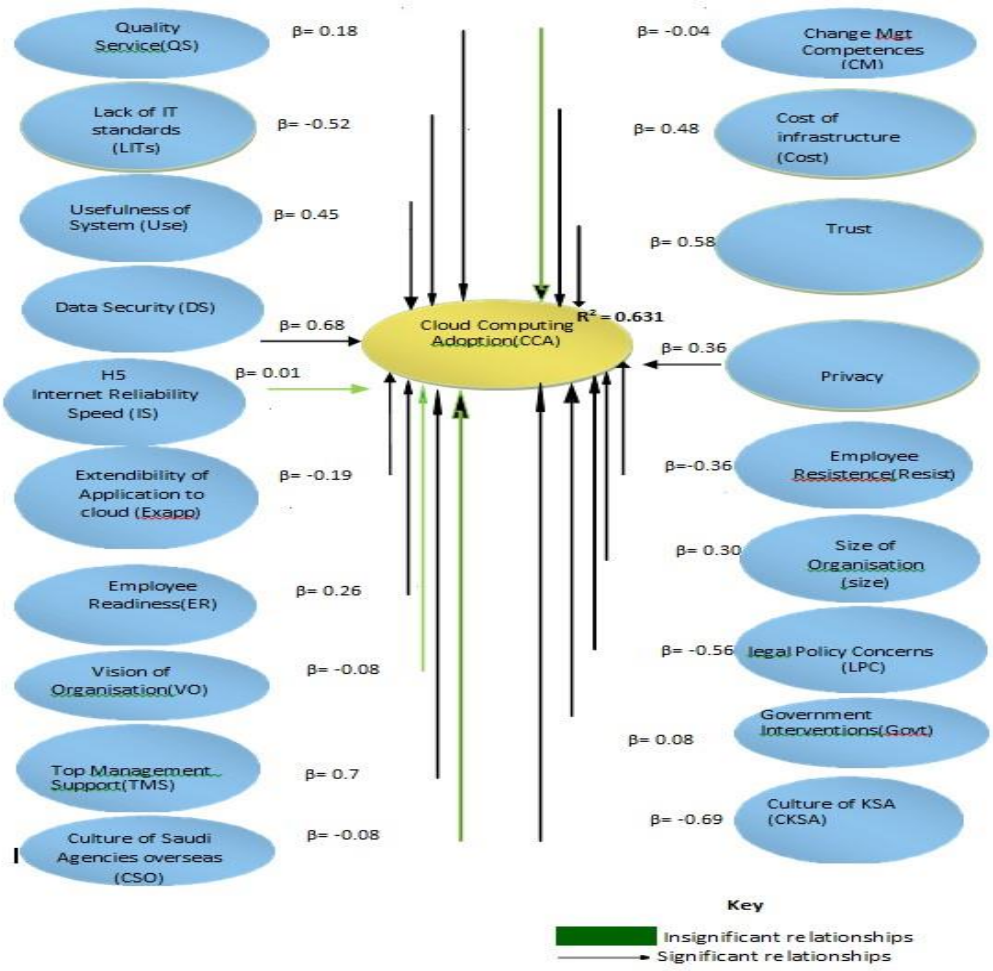

Figure 7-6: Final Structural model

From results of the final SEM model Figure 7-6, it became clear that 15 out of the 19 paths estimated were statistically significant at p<.05 while the remaining 4 paths are not statistically significant for predicting the Cloud Computing Adoption in the organisations of the participants of the present study.

There were hypothesised paths that were statistically significant included H1, H2, H3, H4, H6, H7, H9, H12, H13, H14, H15, H16, H17, H18 and H19. The four paths that were not statistically significant were: H5, H8, H10, and H11.

Specifically, the findings indicated that Quality service; Usefulness of system; Data security; Employee Readiness; Top Management Support; Trust; Privacy; and organisation's size positively influence an organisation's decision to adopt cloud computing. On the other hand, the Lack of IT Standards; Extendibility of application to the cloud; Cost of infrastructure; Employee Resistance; Legislation and policy concerns; Government interventions and Culture of the country (i.e. KSA) negatively influence an organisation's decision to adopt cloud computing. These results were statistically significant at 95% confidence level.

However, contrary to the earlier hypotheses, the results of the present study also suggested that the internet speed and reliability; vision of an organisation; culture of (Saudi) government agencies oversea; and change management competences were not statistically significant in predicting the cloud computing adoption. In other words, these factors do not influence an organisation's decision to adopt cloud computing.

7.10 Assessment of Hypotheses

This section relates the findings with the hypothesised relationships in order to establish the extent to which the findings support or reject the hypothesised relationships included in the conceptual framework developed by the researcher (Figure 5-1).

H1: *Quality service will positively influence an organisation's decision to adopt cloud computing.*

The results indicated that there is a positive statistically significant relationship between the quality services and an organisation's intention to adopt cloud computing. The standardised path coefficient (β) estimates of quality services were 0.184 with a critical ratio of 2.616 (Table 7-16). This finding means that increase in the quality of services by one standard deviation could lead to a 0.184 standard deviation increase in the possibility of an organisation's cloud computing adoption. This result was statistically significant at $p<.05$ level. Therefore, this result strongly supports hypothesis H1 as proposed in the theoretical model.

H2: *Lack of IT Standards will negatively impact on an organisation's decision to adopt cloud computing*

Lack of IT standards was found to negatively impact an organisation's intention to adopt cloud computing. The standard path coefficient (β) of 0.52 suggested that one standard deviation increase in lack of IT standards would lead to 0.52 reduction in the chances of an organisation to adopt cloud computing. This result was statistically significant implying that where there was a lack of IT standards, organisations would be reluctant to adopt cloud computing. This finding confirms hypothesis H2 (Table 7-16).

H3: *Usefulness of the system will positively influence an organisation to adopt cloud computing*

The analysis showed that usefulness of the system has a positive impact on an organisation's decision to adopt cloud computing. The path coefficient (β) of 0.45 suggested that one standard deviation increase in the system usefulness would lead to a 0.45 standard deviation increase in the cloud computing adoption. This result was statistically significant at P<.05. This result supported hypothesis H3 suggesting that when the system is deemed useful, organisations would be more willing to adopt cloud computing.

H4: *Data security will positively influence an organisation to adopt cloud computing.*

The results indicated that data security was positively associated with switching to cloud computing adoption. The path coefficient (β) of 0.68 indicated that increase in data security by one standard deviation would lead to 0.68 standard deviations increase in the possibility of an organisation's cloud computing adoption. This result was statistically significant at p<.05. These findings suggested that where data security is guaranteed, organisations are more likely to adopt cloud computing. This result confirmed the hypothesised relationship suggested in hypothesis H4.

H5: *Internet Speed and Reliability will positively influence organisations to adopt cloud computing*

Although, the findings indicated that the internet speed and reliability was positively related to cloud computing adoption, this relationship was statistically not significant at 95% confidence level. This result showed that the internet speed and reliability do not influence organisations' decisions to adopt cloud computing. **This finding does not support hypothesis H5**.

H6: *Expandability of application to the cloud will negatively influence organisations to adopt cloud computing*

The findings indicated that there was a negative relationship between expandability of application to the cloud and adoption of cloud computing. This meant that where there are more possibilities of expanding the application to the cloud, the organisations would be hesitant to adopt cloud

computing. This result was statistically significant at 95% confidence level. Nonetheless, this finding did not support hypothesis H6.

H7: *Employee Readiness will positively affect Cloud Computing adoption*

Employee readiness was found to positively affect cloud computing adoption. The path coefficient (β) of 0.26 means that one standard deviation increase in employee readiness would lead to a 0.26 standard deviations increase in the cloud computing adoption. This result was statistically significant. Therefore, this observation suggested that organisations with employees who are ready for cloud computing are more likely to adopt cloud computing. This result confirmed hypothesis H7 as suggested in the conceptual framework (Figure 5-1)

H8: *Vision of an organisation will positively impact on its decision to adopt cloud computing*

The findings indicated that there was no significant relationship between the vision of an organisation and cloud computing adoption (p 0.233). This result therefore implied that organisation's decisions to adopt cloud computing was not based on the vision of the organisation but on some other factors. **This result did not support hypothesis H8.**

H9: *Top Management Support will positively influence adoption of cloud computing in organisations.*

Top Management support was found to be statistically significantly positively related to cloud computing adoption. A large path coefficient (β) of 0.7 was obtained and this signified the importance of the top management in deciding on whether to adopt cloud computing. These results suggested that one standard deviation increase in the support of top management would most likely lead to a 0.7 standard deviation increase in the intention of an organisation to cloud computing adoption. Thus, hypothesis H9 was supported.

H10: *Culture of Saudi Government agencies overseas will negatively influence organisations to adopt cloud computing.*

The findings indicated that there was a negative relationship between the culture of Saudi government agencies overseas and cloud computing adoption, this result was not statistically significant (p 0.214). This implied that cloud computing adoption was independent of the culture of Saudi agencies abroad. **This result thus led to rejection of hypothesis H10** suggested in the conceptual framework (Figure 5-1).

H11: *Change Management Competences will positively influence adoption of cloud computing in an organisation*

The results showed that change management competences were negatively associated with cloud computing adoption. Nonetheless, this relationship was statistically not significant (p 0.879). This meant that the decision to adopt cloud computing is not based on whether an organisation has change management competences. Therefore, **these findings did not support hypothesis H11.**

H12: *Cost of infrastructure has a negative effect on the decision to adopt cloud computing.*

The results indicated that the cost of infrastructure negatively affects the decision to adopt cloud computing in organisations ($p < 0.000$). The path coefficient (β) of -0.48 suggested that one standard deviation increase in the cost of infrastructure would decrease the intention to adopt cloud computing by 0.48 standard deviations. This result was significant at 95% confidence level. Therefore, confirming that the high cost of infrastructure prohibits organisations from adopting cloud computing. This result confirmed the hypothesis H12 included in the conceptual framework (Figure 5-1).

H13: *Trust will positively influence the intention to adopt cloud computing in organisations.*

The results showed that the trust has a positive influence on an organisation's intention to adopt cloud computing. The path coefficient (β) of 0.58 suggested that an increase in trust by one standard deviation would increase an organisation's intention to adopt cloud computing by 0.58 standard deviations. This result was statistically significant at 95% confidence level. Thus, the result supported hypothesis H13.

H14: *Privacy will positively influence the intention to adopt cloud computing in an organisation.*

The results indicated that privacy was positively associated with the intention to adopt cloud computing in an organisation. This was observed by a significant path coefficient (β) of 0.36, which suggested that higher levels of privacy would lead to increased chances an organisation adopting cloud computing. The result supported hypothesis H14.

H15: *Employee Resistance will negatively affect an organisations intention to adopt cloud computing*

The SEM results showed that employee resistance negatively impacts on an organisations intention to adopt cloud computing such that one standard deviation increase in employee resistance would lower an organisation's intention to adopt cloud computing by 0.36 standard deviations. To this end, organisations that have employees who tend to resist cloud computing would hamper the organisations intention to adopt cloud computing. This result was significant at 95% confidence level and confirmed hypothesis H15.

H16: *Organisation size will positively affect an organisation's intention to adopt cloud computing.*

The results confirmed the hypothesis H16 by showing that the size of an organisation has a positive effect on a firm's intention to adopt cloud computing. Specifically, a path coefficient (β) of 0.23 showed that an increment in an organisation's size by one standard deviation will increase an organisation to adopt cloud computing by 0.23 standard deviations. This result was significant at 99% confidence level.

H17: *Legal and Policy Concerns will have a negative impact on an organisation's intention to adopt.*

The results showed that legal and policy concerns impact negatively on an organisation's intention to adopt cloud computing. This factor had a larger path coefficient (β = -0.56) compared to other factors meaning that it was a key factor in predicting cloud computing adoption by organisations. The results showed that one standard deviation increase in the legal and policy concerns would decrease an organisation's intention to adopt cloud computing by 0.56 standard deviation. Thus, the findings confirmed the hypothesis H17 suggested in the conceptual framework.

H18: *Government interventions will negatively impact cloud computing adoption*

The results confirmed hypothesis 18 by indicating that government interventions would lessen organisations' intentions to adopt cloud computing (β = - 0.083, $p < 0.000$). This result therefore implied that if government of Saudi Arabia increases its interventions in the areas of cloud computing, more organisations would be hesitant to think of adopting cloud computing. Thus, hypothesis H18 was accepted

H19: *Culture of the Kingdom of Saudi Arabia will negatively impact on organisation's intention to adopt cloud computing.*

The results reported in Table 7-18, showed that there was a negative relationship between the culture of the country i.e. KSA and the intention of organisations to adopt cloud computing. It was noted that this factor had the biggest path coefficient of all the factors (β = -0.689, $p < 0.001$), meaning that it was very important in predicting cloud computing adoption compared to the rest of the factors included in the model (Figure 7-7). Thus, this result suggested that the KSA culture does not support organisations intentions to adopt cloud computing. This finding confirmed the hypothesis H19 suggested in the conceptual framework (Figure 5-1).

Table 7-168: Summary of hypotheses tested

Hypotheses	Result
H1: *Quality service Support will positively influence an organisation's decision to adopt cloud computing.*	supported
H2: *Lack of IT Standards will negatively impact on an organisation's decision to adopt cloud computing*	Supported
H3: *Usefulness of the system will positively influence an organisation to adopt cloud computing*	Supported
H4: *Data security will positively influence an organisation to adopt cloud computing.*	Supported
H5: *Internet Speed and Reliability will positively influence organisations to adopt cloud computing*	Not supported
H6: *Expandability of application to the cloud will positively influence organisations to adopt cloud computing*	Supported
H7: *Employee Readiness will positively affect Cloud Computing adoption*	Supported
H8: *Vision of an organisation will positively impact on its decision to adopt cloud computing*	Not supported
H9: *Top Management Support will positively influence adoption of cloud computing in organisations*	Supported
H10: *Culture of Saudi Government agencies overseas will negatively influence organisations to adopt cloud computing.*	Not supported
H11: *Change Management Competences will positively influence adoption of cloud computing in an organisation*	Not supported
H12: *Cost of infrastructure has a negative effect on the decision to adopt cloud computing.*	Supported
H13: *Trust will positively influence the intention to adopt cloud computing in organisations.*	Supported
H14: *Privacy will positively influence the intention to adopt cloud computing in an organisation.*	Supported
H15: *Employee Resistance will negatively affect an organisations intention to adopt cloud computing*	Supported
H16: *Organisation size will positively affect an organisation's intention to adopt cloud computing.*	Supported
H17: *Legal and Policy Concerns will have a negative impact on an organisation's intention to adopt.*	Supported
H18: *Government interventions will negatively impact cloud computing adoption*	Supported
H19: *Culture of the Kingdom of Saudi Arabia will negatively impact on organisation's intention to adopt cloud computing.*	Supported

Table 7-179 Summary of significant hypotheses

The results reported in Table 7-19, showed the **β** Result of hypotheses in order from biggest to smallest.

	Hypotheses	β Result
1	**H9**: *Top Management Support*	0.7
2	**H19:** *Culture of the Kingdom of Saudi Arabia*	-0.689
3	**H4:** *Data security*	0.678
4	**H13:** *Trust*	0.58
5	**H17:** *Legal and Policy Concerns*	0.56
6	**H2:** *Lack of IT Standards*	0.52
7	**H12:** *Cost of infrastructure*	0.48
8	**H3**: *Usefulness of the system*	0.45
9 **9**	**H14:** *Privacy* **H15**: *Employee Resistance*	0.36 0.36
10	**H16**: *Organisation size*	0.30
11	**H7:** *Employee Readiness*	0.26
12	**H6:** *Expandability of application*	0.19
13	**H1:** *Quality service*	0.18
14	**H18**: *Government interventions*	0.08

7.11 Summary

In this chapter, findings of the present study were presented and used to test the proposed conceptual framework (Figure 5-1) developed by the researcher. As mentioned earlier, a total of 226 respondents were used in the analysis and all of them completed the questionnaire satisfactorily. SEM was used to estimate the measurement model and the structural model.

The measurement model was used in estimation of composite reliability and construct validity as a way of examining the tool in light of properties of the reliability and the validity.

The reliability and validity analyses indicated that 13 out of 19 factors had their Cronbach alpha level at 0.70 and above while 7 factors had their Cronbach alpha between 0.54 and 0.6. In addition, it was noticed that Cronbach alpha for 4 factors would improve if some questions were deleted, this was not adopted because the researcher checked and found that the move would not result in a significant improvement in the reliability statistics.

SEM level analysis was conducted to estimate the relationships between latent factors. Before any further analysis could be done, the SEM model was tested for goodness of fit with the overarching objective to establish whether the given data fits the model. Using various goodness of fit indices, from the different classifications, the initial model estimates did not give a good fit. However, this

significantly improved on allowing for inclusion of covariance links between the latent factors (in the revised model).

On estimating the revised SEM model, it was found that several factors: Quality service; Usefulness of system; Data security; Employee Readiness; Top Management Support; Trust; Privacy; and organisation's size positively influenced an organisation's decision to adopt cloud computing. These results are statistically significant at 95% confidence level. On the other hand, some factors: Lack of IT Standards; Extendibility of application to the cloud; Cost of infrastructure; Employee Resistance; Legislation and policy concerns; Government interventions and Culture of KSA negatively influenced an organisation's decision to adopt cloud computing.

However, contrary to the earlier hypotheses, there was not enough evidence to suggest that the following factors influence an organisation's decision to adopt cloud computing. These factors including: Internet speed, vision of an organisation, cultural of Saudi government agencies overseas; and change management competences were not statistically significant in predicting cloud computing.

Finally, this chapter summarised the assessment of the hypotheses in the light of the findings to establish the hypotheses that were supported (accepted) based on the findings and identified the hypotheses that were rejected in the present study. This evaluation showed that 15 out of the 19 paths estimated in the SEM model confirmed the hypotheses suggested in the conceptual framework (Figure 5-1) developed by the researcher. A discussion on these findings follows in the next chapter.

Chapter 8 Discussion of the Findings

8.1 Introduction

In this chapter, the findings of the research are discussed in relation to the empirical literature and theory. The chapter starts with a summary of the findings of the study.

The study undertook to identify key factors that Saudi organisations operating overseas should consider when deciding whether to adopt cloud computing, and sets out a framework for how these factors can be weighed in order to make cloud adoption decisions. It is anticipated that the recommendations of this study would inform decision making by the Saudi Authorities in the era of cloud computing.

The study is anchored on an overarching desire to investigate the factors, including organizational, technological, environmental and cultural pressures, which influence the adoption of cloud computing in Saudi Government Overseas Agencies with an ultimate aim of developing a comprehensive framework which can assess cloud computing readiness of Saudi Overseas Agencies.

Various hypotheses (refer to section 7.9) about the relationships between organizational, technological, environmental, cultural pressures; and adoption of cloud computing have been suggested and tested. The Structural Equation Modelling (SEM) technique is used to test the hypotheses. This is based on the fact that the study entails analysing relationships between measurement variables and latent constructs; and relationships amongst the latent constructs.

A total of 19 paths were analysed and the findings indicate that Quality service; Usefulness of system; Data security; Employee Readiness; Top Management Support; Trust; Privacy; and organisation's size positively influenced an organisation's decision to adopt cloud computing. These results are statistically significant at 95% confidence level. On the other hand, some factors: Lack of IT Standards; Extendibility of application to the cloud; Cost of infrastructure; Employee Resistance; Legislation and policy concerns; Government interventions and Culture of KSA negatively influenced an organisation's decision to adopt cloud computing. However, contrary to the earlier hypotheses, the results also indicated that internet speed and reliability; vision of an organisation; culture of Saudi government overseas agencies; and change management competences were not statistically significant in predicting cloud computing. In other words, these factors do not influence an organisation's decision to adopt cloud computing.

8.2 Technology factors and Cloud Adoption

8.2.1 Quality of service

It was hypothesized that Quality of Service (QS) positively influences adoption of cloud computing in Saudi government overseas agencies. The findings support the hypothesis in that QS is positively associated with Cloud Computing Adoption (CCA). This implies that where quality of service provided is better, then organizations are more likely to adopt cloud computing. This is a cross-cutting finding and it is a widely held common belief for most of service provision. To illustrate, within the Tornatzky and Fleischer (1990) framework of Technological-Organisation-Environment (TOE), quality of technology is at the centre before an organization takes decision to adopt cloud computing. This is because the quality of service in cloud computing is fundamental for cloud users, who demand particularly high quality standards as a way of averting risks associated with migration to cloud computing (Ardagna et al., 2014).

This finding is critical particularly to those that intend to provide cloud computing services to KSA overseas agencies as it encourages them to focus attention on the quality of services to be provided. Nonetheless, given the complexity in defining quality, efforts are required by the providers to customize services to the quality demands of each client on a case-by-case basis. This would call for more engagements between the client and the provider to ensure that an agreement is reached with regards to the quality specifications demanded by the client and what can be provided by the supplier.

8.2.2 Lack of IT Standards

According to the findings, lack of IT standards (LITs) is negatively associated with CCA and this relationship is highly significant. This implies that LITs discourages organizations from adopting cloud computing. This result was anticipated according to available literature. Marston (2011) argues that lack of standards not only compromises the portability between services and applications, and even between service providers, it also makes the customer wholly and solely dependent on the vendor. The beta coefficient of LITs is bigger compared to the rest which is an indication that organizations pay maximum consideration to it before taking decision to migrate to cloud computing.

This finding is of significant importance to the context of the KSA where the proliferation of cloud computing is still at nascence. Therefore, this finding suggests that the country, agencies and actors to ensure that appropriate IT standards are in place to support the adoption of cloud computing. In their study of “The Role of Standards in Cloud-Computing Interoperability”, Lewis (2012) reinforces

the need for standards in cloud computing on the backdrop that it enables interoperability. Interoperability refers to the ability to easily move workloads and data from one cloud provider to another or between private and public cloud domains (Lewis, 2012). This can only happen if data and other aspects of the clouds are standardized.

8.2.3 Usefulness of system

It was hypothesized that usefulness of a system would be positively associated with CCA. The findings support the hypothesis. To this end, there is a positive and significant relationship between system usefulness and CCA. This implies that organizations consider the usefulness of a system when adopting cloud computing such that the more a system is useful, the higher the chances of an organization adopting cloud computing. This finding is aligned to those of Hsu et al. (2014) in their study that found out that perceived usefulness of the system is among others a significant determinant of migrating to cloud computing. They argue that the usefulness of cloud computing technology will help and accelerate the adoption of cloud computing within an organization (also see Andrei, 2009; Catteddu & Hogben, 2009).

This finding provides clear evidence, particularly to the cloud computing providers that clients are always concerned with the amount of benefits that they can derive from cloud computing in relation to the costs of entailed on adoption of cloud computing. To this end, there is a need to understand the needs and anticipated benefits from cloud computing by each client so as to design appropriate service packages with the perceived usefulness. This is on the backdrop that each client has their own perception usefulness and benefits that they intend to derive from cloud computing (Low et al, 2011).

8.2.4 Data security

Data security was found to be positively and significantly associated with CCA ($\beta=0.68$, $p<0.001$). This result was anticipated in the hypothesized relation. Therefore, the results support the hypothesis. From the findings, organizations categorically stated that they would consider migration to cloud computing if it were secure enough to store organization data, and if the benefits outweigh the risks of cloud computing. These concerns are based on the fact that the architecture of cloud computing poses particular risks to the security of customers (Gupta & Kumar, 2015). Various studies have reported security concerns as one of the most critical consideration to adopting cloud computing.(Zissis, 2012) indicate that organizations are concerned that given that data in cloud computing is segmented, it can easily be intercepted hence posing threats to an organization. Similar sentiments are held by Jensen & Schwenk, (2009) who indicate that “since the services of cloud computing are delivered remotely over the Internet and the resources are

accessible to the service provider, third party access can result in malicious exposure of the organization ". Also, some studies maintain that more data insecurity associated with cloud computing arises out of the " transfer of information within different applications of cloud computing, leakage of information while uploading data to cloud, attacks on privacy and security of user's data, loss or malicious manipulation of encryption keys and conflicts between service providers and customers on procedure and policies on the operation of cloud computing applications" (CSA, 2009, 2010; Hogben & Catteddu, 2009; Ristenpart et al., 2009).

All these revelations communicate a clear message that the need for data security can never be overemphasized if organizations are to adopt cloud computing. Consequently, the current study's finding is critical and encourages all service providers and stakeholders to invest more in the security of the soft and hard systems that are used in cloud computing. This is due to the high risks associated with cloud computing. Catteddu and Hogben (2009) advises that cloud computing providers and users should always ensure that they use standard technologies and solutions; employ encryption keys; conduct co-residency checks; correctly configure the system; ensure forensic readiness and sanitization of sensitive data; and most importantly ensure audits or certifications on the part of the cloud service provider.

8.2.5 Internet Reliability and Speed

It was originally anticipated that internet reliability and speed is positively and significantly associated with CCA. Whereas the findings indicate that the relationship between internet reliability and speed and CCA is positive, it is not statistically significant. This implies that organizations do not treat internet reliability and speed as very important in deciding whether to adopt cloud computing or not. This finding was not anticipated and contradicts most of empirical literature. Foremost, Chang (2015), indicate that higher speed reliable internet is very important in cloud computing given that connectivity to such network improves the performance and storage of sensitive information outside the location of an organization. Similarly, Raza et al. (2015) in the study titled "The Slow Adoption of Cloud Computing and IT Workforce" indicates that low internet speed and reliability was a great hindrance to organizations from adopting cloud computing.

This finding is not intended to mean that internet reliability and speed is not important in migrating to cloud computing and it should not negatively impact policy. Rather, it should be understood within a context. Most likely, it might have arisen due to the fact that most of the respondents were not aware of the importance of internet speed and reliability. Also, it could also be that within the participating institutions, internet reliability and speed is not seen as an issue. This finding should therefore form the basis for more investigations within the context of KSA.

8.2.6 Extendibility of Application to the cloud

It was hypothesized that extendibility of the applications to the cloud would be positively influence cloud adoption. This was not supported by the findings. The findings indicate that extendibility of the applications is negatively associated with cloud adoption. This implies that organisations believe that where the cloud can extend dynamically, this character would discourage them from adopting cloud computing. This is contrary to the common belief and carried in the available empirical literature. Zhang et al. (2010) observes that many organisations would adopt cloud computing if it can extend dynamically to meet the increasing demands of service. According to Zhang, organizations would always be eager to migrate to cloud computing if it is able to provide many possibilities for users.

The negative association between extendibility of the cloud and willingness to adopt cloud computing needs to be interpreted with caution. Most likely, the negative relationship could have been influenced by the imagined risks that could arise out of the cloud being very flexible. This therefore implies that risks associated with extendibility could be the confounding factor to the relationship found in this study. Accordingly, service providers and stakeholders would need to ensure that extendibility character of the cloud does not compromise the security features of the cloud. This would most likely imply more security and perhaps increase the willingness of the organisations to adopt cloud computing.

8.3 Organizational factors and Cloud Adoption

8.3.1 Employee Readiness

Employee Readiness is an Organizational Factor and it was hypothesized to be positively associated to CCA. The findings supported the hypothesis. Therefore, according to the findings, there is a significant relationship between ER and CCA. This implies that in organizations where employees have been made ready for cloud computing, there is a higher likelihood of such an organization adopting cloud computing. This result is consistent with much of the existing literature (see Carcary et al., 2014; Shah, 2011; Yang et al., 2015; Surendro, & Fardani, 2012). The arguments for the positive relationship are mainly based on the drivers of organization change in which the employees are seen as the change agents who could be barriers or enablers of change in their organizations depending on the level of preparedness. Carcary et al. (2014) argues that organizations should strive to develop positive attitudes and behaviours regarding any organizational change. Similarly, Yang et al. (2015) observes that it is the employees who will use the system and therefore effort should be directed towards making them able to function fully and adopt the new innovation. This

would therefore call for specialized training (Surendro, & Fardani, 2012) among others, to improve capacity for employees to cope with migration to cloud computing.

8.3.2 Top management support

Top Management Support (TMS) is another organization factor thought to drive the decision to adopt cloud computing in organizations. The findings indicate that TMS is highly positively and significantly associated to CCA (β=0.7, Critical Ratio=8.5). This implies that with more top management support, many organizations are more likely to adopt cloud computing. The coefficient of the relationship between TMS and CCA is the highest of all, which signifies that TMS is the most important driver of the decision to adopt cloud computing compared to the rest of the variables. This result is consistent with available empirical literature. To illustrate, it is management that takes the decision to adopt cloud computing and that makes sure that the technological, environmental and other organizational factors are kept in balance to support or hinder migration to cloud computing. Various studies including Low et al. (2011), Alshamaila et al. (2013) and Oliveria et al. (2014) have found top management support as a highly significant driver of cloud adoption. This is not surprising given that all decisions and co-operant factors for cloud computing adoption are controlled by management. This therefore implies that organisations need to have top management that supports the cloud computing agenda for it to manifest.

8.3.3 Culture of Saudi Agencies Overseas

The study hypothesized that Culture of Saudi Agencies Overseas (CSO) would be negatively associated with CCA. Whereas the findings indicate a negative relationship between the two variables, this relationship is not statistically significant. This implies that while respondents believe that CSO was negatively related to CCA, it did not influence their decisions to adopt cloud computing. There are not many empirical studies that have studied CSO and CCA and so it is difficult to relate it to the findings of existing studies. Nonetheless, this finding could be imply that the Saudi Agencies Overseas, do not have an individual culture (that is the Saudi home culture is stronger) and they do not have autonomy over the decision and therefore the culture in that country does not affect the decision to move to the cloud.

8.3.4 Vision of the Organization

Vision of an organization is another organizational factor thought to drive an organization's decision to adopt cloud computing. Organisations tend to have visions which act as their operation compass towards which all efforts of all employees are directed to achieve it. To this end, this study

hypothesised that organisations with a vision to move towards cloud computing are more likely to adopt cloud computing than those whose vision does not have any indication of doing so. To this end, it was anticipated that there could be a positive relationship between vision of the organization and CCA. However, this hypothesis was not supported. Contrary to the hypothesis, the findings indicate an insignificant negative relationship between organization vision and CCA. This result could in the first instance be taken to mean that organizations do not base their decision to adopt cloud computing on their vision statements. The finding could as well presuppose that most of the organizations that participated in the study do not have vision statements or if they did, then such a vision does not drive decisions to adopt cloud computing. The fact that there are not many empirical studies that have studied organization vision and CCA, make it challenging to try and relate this finding with the available literature. This therefore implies that many more studies on this aspect need to be conducted.

8.3.5 Change Management Competences

Change Management Competences were found to be insignificant in influencing organisations' decisions to adopt cloud computing in the KSA. This result is inconsistent with the hypothesized positive and significant relationship. The finding is also inconsistent with available empirical literature. Foremost, Pan and Jang, (2008) hint that managers of the organizations require change management expertise, not only to implement the migration to new technologies but also manage the process of migration to ensure minimal interruption of the organization's operations. This would then require leaders to have change management competencies in their organizations to adopt cloud computing. Within the context of KSA, this factor is regarded as important in organisations' decisions to adopt cloud computing. Almubarak (2017) in the study investigating cloud adoption in KSA hospitals, noted that cloud adoption leads to organization change and that the success of the change is highly related to the ability and capacities of managers.

The above literature cited reinforces the fact that Change Management Competences are critical to cloud computing adoption. This therefore makes this finding difficult to interpret. Nonetheless, this finding could be context bound and its interpretation needs to be restricted to the context. Foremost, the respondents to this study were government agencies operating overseas which tend to have highly competent managers who are most likely to handle change amicably. To this end, lack of variation in the competence levels for change management might explain the non-significant relationship between this variable and CCA. It is however critical to note that this explanation is still hypothetical that needs further examination through other empirical studies.

8.3.6 Cost of Infrastructure

Cost of infrastructure was found to be negatively associated to CCA and this result is statistically significant. This finding supports the hypothesized relationship. This therefore implies that when the cost of infrastructure for cloud computing is high, it discourages organisations from adopting cloud computing. This finding is consistent with those of most of the empirical studies. In their analysis of the costs considerations to adopting cloud computing, Connor et al. (2014) highlights that given the increasing costs for government technology services coupled with the decreasing budgets, organisations are looking for cheaper options including adopting cloud computing as an alternative. This therefore implies that cost is at the centre of decisions to adopt cloud computing. Connor et al. (2014) continues to indicate that whereas cloud computing is thought to be cheaper than other alternatives, it also has many cost elements that should be a concern to organizations. Some of these include: Communications Facilities lease, maintenance, service level agreements, travel, software maintenance, hardware maintenance, and refresh personnel system test and evaluation, and automated information system development and procurement (Connor et al.,2014).

Within the organisations in the KSA, cost stands out as a core factor that drives the decision to adopt or not adopt cloud computing. Alsanea (2015) found a cost as one of the most important factors considered by firms in KSA before adoption of cloud computing. Similarly, Almubarak (2017) observes that KSA hospitals were migrating to cloud computing due to the possibility of lowering operational costs incurred on traditional IT services. It is imperative to note that the initial costs and investments associated with cloud computing are enormous but it is argued that this investment bears major benefits and in the long run, organizations tend to spend less on cloud computing compared to other alternatives.

This finding encourages the stakeholders including service providers to adopt fair cost models that are responsive to the economic abilities of their clients. Nonetheless, it becomes challenging to balance the kind of quality and data security requirements and low costs as might be required by client. This is because quality costs a lot of resources which must be recovered by the providers. To this end, it is critical for KSA organisations to understand that while cost is a key factor for them deciding whether or not to adopt cloud computing, they must be willing to meet the cost of the quality systems that they require. Also, given that cloud computing is still at nascent stage in KSA, and yet organizations view it as expensive, it would be feasible for the government of the KSA to subsidize of some general infrastructures to spur proliferation of cloud computing in organizations that are being prohibited by costs.

8.3.7 Trust

Given that cloud computing exposes an organization's data and operations to third parties, it is critical that the third party is trustworthy. According to Alkhater (2015, p2), " trust in the cloud environment heavily depends on trusting the service itself and the provider to provide a trusted level of authenticity, integrity and confidentiality in regard to the service and the stored data." To this end, this study hypothesized a positive and significant relationship between trust and CCA. The findings supported the hypothesis in that there is a positive and significant relationship between trust and CCA. This therefore implies organisations consider trust in their decision to adoption cloud computing. To this end, where providers are highly trusted, it is anticipated that more organizations would migrate to cloud computing. Similar findings have been reported elsewhere. For instance, Almubarak (2017) found that trust of cloud vendors was one of the most important factors to adopting cloud computing. Similarly, Alkhater (2015) found trust as highly significant in driving decisions to adopt cloud computing.

The significant result obtained for the relationship between trust and CCA signify the importance that Saudi government agencies attach to trust. Just like Alsanea (2015) observes, "Saudi government agencies are very strict and sensitive concerning trust. They do not find it easy to trust other organisations especially when they have to deal with outsiders who manage and handle their IT services. Also, it has been shown that the government organisations would not trust the service providers if they were not government entities, and the military sector gives this issue special attention. If trust does exist, it will undoubtedly help government organisations to adopt cloud computing more rapidly".

8.3.8 Privacy

Privacy was found to be positively related to CCA. This result is significant at 99% confidence level. This implies that privacy is one of the key drivers of cloud adoption in organisations in the KSA. According to this result, more organisations would be willing to migrate to cloud computing if providers guaranteed the privacy of clients. This on the backdrop that sensitive information that needs to remain private is access by the cloud provider who may sometimes allow other parties to access such information, hence making it public. The majority of empirical studies have identified privacy as critical to Saudi organisations (see Alharbi, 2016; Alkhater, 2015). It is however interesting to note that Alsanea (2015) found a negative relationship between trust and CCA. This difference was mainly caused by the differences in the way the variable was conceived and measured by the two studies. Whereas in the current study, privacy is measured in positive terms, Alsanea conceived and measured it as a risk. Some of the reasons given for the significant

relationship between privacy and CCA include the fear that organisational data on the cloud maybe exposed to unauthorised parties without the explicit permission of the owner; and that their activities would be monitored over or seen by any third-party organization (Alsanea,2015).

This finding is critical as the relevant agencies to ensure that policies, laws and institutions are in place and enforce them for compliance.

8.3.9 Employee Resistance

Employee Resistance (ER) is an organization factor and was hypothesized to be negatively related to CCA. The results confirmed the hypothesis in that ER was found to be negatively related to CCA (β=-0.36, Critical Ratio=2.41, $p<0.01$). This therefore means that with more employee resistance, cloud adoption would be less likely. In other words, where employees resist cloud computing, organizations are more likely to not adopt cloud computing. This result is a manifestation of the fear that employees may have because of the likely loss of power in the organization on introduction of cloud computing. This is on the backdrop that some manual activities will have to be substituted by the functions of cloud computing. Also, some employees do not like change unless they are well prepared for it and naturally are inclined to resist it. Alsanea (2015) observes that sometimes employees resist cloud computing and other changes just because they do not understand and appreciate the benefits that are likely to accrue from such changes. In the light of the above, Pan and Jang, (2008) observe that “the human resource management (HRM) department of the organisation and top executives must collaborate in their efforts to change the attitudes of employees to prepare them for the new technologies being introduced, in order to increase the performance and productivity of both the staff and the organisation as a whole. And as earlier on hinted, the managers of the organization require change management expertise, otherwise the implementation of the technologies cannot be made." This finding would also encourage organisations to provide training and to conduct awareness programmes to overcome the impact of resistance.

8.3.10 Organization size

It was hypothesized that the size of an organisation may have an influence on its decision to adopt cloud computing. In support of the hypothesis, it was found that organisation size was positively associated with CCA, and the result was significant at 99% confidence level. This therefore means that, organisations believe that large sized organisations would most likely adopt cloud computing. This finding is consistent with the findings of Anand and Kulshreshtha (2007), AlBar and Hoque (2015), Oliveira et al. (2014), and Abdollahzadehgan et al. (2013). However, the result is partially corroborated by Alsanea (2015), who reported ambivalent results by stating that size may or may

not influence an organisations decision to adopt cloud computing. Equally, Alhammadi (2015) did not find size of the firm as an influential factor for CCA. With specific reference to the KSA, Alkhater (2015) found that organisation size was a significant factor to consider before adoption of cloud computing. It is however critical to note that, in as much as most of studies found size a significant factor for CCA, there is lack of agreement as to which size positively or negatively influences cloud adoption.

The significant relationship between size and CCA could be explained by the fact that large organisations tend to have more need for computing services and may have the resources required to migrate to the cloud. This therefore implies that it may not be size per se but the fact that large organisations tend to have more resources required for CCA compared to smaller organisations. On the other hand, there could be counter arguments indicating that smaller organisations need cloud computing perhaps more than large organisations as the former would require to save resources by adopting cloud computing. The lack of agreement on the exact effect of size on cloud computing adoption necessitates further studies to be conducted around this variable.

8.4 Environmental factors and Cloud Adoption

8.4.1 Legislation and policy concerns

Legislation and policy concerns (LPC) within the KSA are negatively related to CCA. This was anticipated as seen from hypothesis 17. Similar findings are carried in other studies such as those of Asean's (2015) study. Raza et al. (2015) also observed that lack of regulatory agencies and policies tend to limit proliferation of cloud computing. This realization makes this factor even more important for organisations in the KSA where the legislation, policy and institutional architecture is still nascent (also see Asean, 2015).

In the study, respondents indicated that legislation and policy concerns are critical issues that affect their decisions to use cloud services. Foremost, just like Asean (2015) observes, legislation and policy architecture greatly affect the operations of organisations. This implies that, where legislation and policy favour cloud computing, many organisations will most likely consider adoption of the cloud and the reverse is also true.

This finding therefore encourages the Saudi Authorities to adopt friendly policies that would enhance adoption of cloud computing but without compromising the security of users. Rather, the policies and legislation should provide the required checks and balances within the cloud computing to maximize the benefits associated with cloud computing while minimizing the risks associated with cloud computing. Specifically, there is need for legislation and policies to arise out of thorough

debates and wider consultations with key stakeholders and positive culture needs to be encouraged as well. This is because it is out of such a process that various challenges can be anticipated and amicable solutions that are acceptable to most of the stakeholders can be generated to stand the test of time.

8.4.2 Government Intervention

The findings indicate that government interventions particularly in cloud adoption discourage agencies from adopting cloud computing. Some respondents indicated that it is government practice to intervene in government organizations leading to decisions on whether or not to adopt cloud service. This therefore implies that government interventions have high impact on a government organization's decision to adopt cloud computing. This finding was anticipated in hypothesis 18. The finding is on one hand consistent with literature and on the other hand contra to available literature. Asean (2015) found a significant and positive effect of government intervention on CCA. Asean hints that government intervention in the form of support is very important to facilitate the adoption process. Moreover, given the very strong influence that the KSA government has on both government and private enterprises, it undoubtedly drives cloud adoption decisions. The current finding also contradicts that of Alhammadi (2015) who found government intervention to have significant and positive effects on cloud adoption in KSA. It is however critical to note that the two studies conceive government intervention differently. While the current study looks at intervention as a government control tool, Alhammadi (2015) perceives it as a support role hence the difference in the direction and strength of the results. Lai et al.'s (2014) findings partly confirm the current study findings and also contradict it. This is because Lai et al. (2014) argues for differentiated government intervention effects on CCA. Lai etal. finds that small and medium enterprises (SMEs) tend to benefit more from government interventions for cloud adoption compared to large enterprises.

All the differences in the findings notwithstanding, it is clear that government interventions do influence organizations' decisions to adopt cloud computing. This therefore implies that government interventions should mainly focus on support roles for institutions to uptake cloud computing rather than emphasizing a control role which tends to discourage organizations from taking up cloud computing.

8.4.3 Culture of the KSA

Culture of the KSA was anticipated to negatively impact on CCA. The findings are consistent with the hypothesis (β=-0.69, Critical Ratio= 7.29, $p<0.001$). This implies that this variable is a key driver for cloud adoption. In this study, the findings indicate mean that the KSA culture is a barrier to cloud

adoption. This finding is consistent with those of various empirical studies including Allen et al. (2002), Kamal (2006), and Jiunn-Woei et al. (2014). According to Asean (2015), Islam defines the way of life of the KSA and has a greater influence on what happens in organisations. Secondly, Saudi communities are highly tribal such that tribes influence much of what happens in the organisations.

This finding should not in any way be taken to condemn the Saudi culture. Rather, there is need for a critical examination to highlight such aspects of the culture that may seem to be barriers to the adoption of cloud computing and chart out ways of discounting their impact. Moreover, the positive aspect of the KSA culture that facilitates adoption should be emphasized and encouraged. `Most importantly, this study advocates for national awareness programmes and interventions to reduce on the culture of resistance to change and inclination to status quo.

8.5 Summary

This chapter discussed the findings of the study in light of the empirical literature relevant to the study. Foremost, the study sought to investigate key factors that Saudi organizations operating overseas consider when deciding whether to adopt cloud computing, and sets out a framework for how these factors can be weighed in order to make cloud adoption decisions. It is found that only four hypotheses were not supported by the findings. Moreover, it is clear that most of the findings were consistent with empirical literature but with some being inconsistent.

For instance, inconsistences between the findings of this study and those of empirical studies were common with factors such as: Internet Reliability and Speed; Extendibility of Application to the cloud; Change Management Competences; and Government Intervention. It is anticipated that such inconsistences were due to differences in contexts in which the studies took place; differences in time of the studies; and differences in methods used among others. These underpin the key recommendation that calls for more studies around these variables.

The discussion gave recommendations and it is anticipated that they would inform policy on CCA in the KSA. This study realizes that given the nascence of cloud computing in the KSA, there is need for evidence to inform policy. Particularly, the study encourages policy makers to exploit the positive influencers of CCA while at the same time mitigating the barriers (negative influencers) to CCA. Further, this discussion realized that some factors for adoption of cloud computing have not been comprehensively studied. A case in point is the relationship between Culture of Saudi Agencies Overseas and CCA. To this end, the most logical step suggested by this study is to have more empirical studies about the same.

Chapter 9 Conclusion, Contribution and Future Work

This section provides the research Conclusion, contributions and study findings to the theory and practice of cloud computing adoption. This research has sought to identify the key factors that are instrumental in consideration of cloud computing adoption the research has shown the factors that are concern in cloud adoption. Including organizational, technological, environmental and cultural pressures, which influence the adoption of cloud computing in Saudi Government Overseas Agencies.

The results serve to show where the concerns are as well as how obstacles to cloud adoption can be overcome. In this sense the study has been comprehensive, because it has covered all of the areas that need to be considered, both internally and externally to the organisation.

Findings of the present study were presented and used to test the proposed conceptual framework (Figure 5-1) developed by the researcher. As mentioned earlier, a total of 226 respondents were used in the analysis.

The SEM level analysis was conducted to estimate the relationships between latent factors. Before any further analysis could be done, the SEM model was tested for goodness of fit with the overarching objective to establish whether the given data fits the model. Using various goodness of fit indices, from the different classifications, the initial model estimates did not give a good fit. However, this significantly improved on allowing for inclusion of covariance links between the latent factors (hence called the revised model).

On estimating the revised SEM model, it was found that several factors: Quality service; Usefulness of system; Data security; Employee Readiness; Top Management Support; Trust; Privacy; and organisation's size positively influenced an organisation's decision to adopt cloud computing. These results are statistically significant at 95% confidence level. On the other hand, some factors: Lack of IT Standards; Extendibility of application to the cloud; Cost of infrastructure; Employee Resistance; Legislation and policy concerns; Government interventions and Culture of KSA negatively influenced an organisation's decision to adopt cloud computing.

However, contrary to the earlier hypotheses, the results also indicated that internet speed and reliability; vision of an organisation; culture of Saudi government agencies overseas; and change management were not statistically significant in predicting cloud computing. In other words, these factors do not influence an organisation's decision to adopt cloud computing. Finally, the summarised the assessment of the hypotheses in the light of the findings to establish the hypotheses that were supported (accepted) based on the findings and identified the hypotheses that were not accepted / rejected in the present study (see chapter 7). This evaluation showed that

16 out of the 19 paths estimated in the SEM model confirmed the hypotheses suggested in the conceptual framework (Figure 5-1) developed by the researcher.

The results to a greater extent mirror the original conceptual framework. This is demonstrated by the fact that out of 19 hypotheses, only four were not supported by the dataset. This is always expected in studies that involve people. However, the modifications that were done to the model suggest that further research is needed to validate the modifications.

9.1 Research Contributions

9.1.1 First Contribution

The first contribution of this research is the theoretical contribution of the present study related to the proposed framework. The conceptual framework was built following an extensive review of previous literature and interviews with IT experts (see Chapter 5). The framework was then confirmed using data collected through the use of a questionnaire (see chapter 5).

9.1.2 Second contribution

The second contribution of this research is the theory of cloud computing adoption through the developed instrument. The questionnaire items were adapted from published studies. With the tool's validity and reliability having been established, it can be used in future research efforts investigating adoption of new technologies. Additionally, the Arabic version of the instrument can be resourceful to future researchers interested in Arabic contexts. Therefore, future researchers interested in cloud adoption among Government Overseas Agencies in particular, and new technologies adoption, in general, will find this research valuable.

9.1.3 Third contribution

The third contribution of this research is the final structural model from results of the final SEM model (Figure 7-6), it became clear that 15 out of the 19 paths estimated were statistically significant. This illustrates a good model power that is able to predict more than 50% of the total variance in the outcome variable.

9.2 Implications of the Study to Practice

9.2.1 Implications of the Study to Service Providers and Technology Consultants

The Saudi Arabia Government Overseas Agencies sector is a key segment for cloud service providers and software manufacturers because the majority of the businesses in the country belong to the private sector within Saudi Arabia. Consequently, the present research findings have crucial implications for technology consultants and cloud technology providers. To these cloud computing stakeholders, the present study identifies the problems facing overseas agencies in relation to the adoption of cloud services, and the factors that shape their decision to adopt cloud computing services.

From an external point of view the Saudi Arabia Government Overseas Agencies operate like any other country's overs agencies. This is part of being a diplomatic service overseas and there is an accord to be followed. However, internal to the agencies they operate in a culture and system that reflects the Saudi geo-political concerns, which are very different to other countries, and even countries from the same part of the world..

The findings of the present study revealed that most of the Saudi Government Overseas Agencies did not adopt cloud computing service. This finding implies that cloud providers need to play more active roles in creating awareness and understanding of the benefits associated with cloud computing among Overseas Agencies and identify key factors that Saudi organisations operating overseas should consider when deciding whether to adopt cloud computing. This may be achieved through various promotional efforts such as workshops and seminars. In addition, such promotional activities can enhance the Saudi sense of community and culture. Promotional activities are powerful tools for enhancing not only the rate of adoption of innovation but also the speed with which organisations adopt such innovations (Iacovou et al., 19995).

Further, the present study has shown that Saudi Government Overseas Agencies are, in addition, not confident about their security and privacy in the cloud computing environment. These challenges have been serious impediments to the adoption of cloud computing among the Agencies. Therefore, cloud providers need to put more effort in proving appropriate support to government agencies with overseas operations in order to improve the adoption of cloud computing technology. The cloud providers need to provide support all the time. The cloud technology providers may provide support by facilitating organisations to run trial versions of the cloud computing technology for an adequate length of time. This would give the organisations an opportunity to evaluate the benefits of cloud computing to their businesses. Addition, it will diminish concerns related to compatibility. It is, in addition, necessary for cloud providers to take into consideration the location

of the data centres of Government Overseas Agencies to be within Saudi Arabia as some of them are related to embassies. Such a move would meaningfully minimise security and privacy concerns of the organisations as well as compliance problems. The move would further result in the creation of a secure environment and diminish the uncertainty that may be associated with cloud computing technology.

All in all, the findings of the present research project have crucial implications for cloud providers. In addition to enabling the cloud providers to understand the reasons for the low adoption of cloud technology among Saudi Government Overseas Agencies, the study has provided an opportunity to understand the factors driving other organisations to adopt cloud computing technology. The results, therefore, enable cloud technology providers to understand the barriers and drivers of cloud computing among Saudi Government Overseas Agencies, as such understand the kind of efforts and strategies they need to put in place in order to improve adoption of cloud computing technology.

9.2.2 Implications to the Government

The findings of the present research have an important implication for the government. More specifically, the findings suggested that the physical location of cloud data centres has a meaningful effect on compliance with the rules regulating privacy. The reason is that different countries have different privacy-related legislation. To address compliance and privacy concerns, the government needs to provide a significant report. The government may need to introduce relevant regulations or update existing regulations to enhance compliance with cloud computing regulations. For instance, the government can lobby and coordinate the legislation between different countries in relation to data protection in cloud computing.

9.2.3 Implications of the Findings to Top Management

The organisational executives need to provide sufficient support to improve the adoption of cloud computing technology among Saudi Government Overseas Agencies. The findings of the study demonstrated that employee resistance, one of the meaningful factors, can be manipulated to positively influence cloud computing adoption among Saudi Government Overseas Agencies. Saudi Government Overseas Agencies are suffering from a continued lack of assistance from the top management in relation to cloud computing adoption. This is an indication that the successful adoption of cloud adoption is not only dependent on the views of IT experts in the organisations but also the views of the organisation's top managers. Therefore, a successful adoption of cloud computing will require the support of both top managers and ICT experts from the ICT department of the Saudi Government Overseas Agencies.

The findings of the present research, including the proposed model, are of great significance to the managers. The findings may help in the evaluation of cloud technology characteristics and the features of the Government Overseas Agencies, including their environmental context, before the employment of cloud computing services. Additionally, the proposed model can guide managers in the assessment of other technologies in the future. It is also necessary for the managers to consider engaging cloud computing providers who share the idea that the data centre should be located in Saudi Arabia. The cloud computing provider should, moreover, provide sufficient pre-pre-adoption and post-adoption. Further, top organisational managers should consider cloud computing service providers who are able to provide support to the organisation's future plans to adopt cloud computing.

Considering the contributions discussed in the preceding sections, it can be observed that the present research has important implications for agencies, cloud computing service providers, and an organisation's top management. In addition, the preceding discussion has highlighted the role of the government and policymakers in facilitating and growing adoption of cloud computing among Saudi Government Overseas Agencies.

9.2.4 Lessons from the Research project

This research journey has provided an opportunity to learn important lessons. First, it emerged that the literature review plays a pivotal role in a research project. For instance, it was after conducting an extensive review of literature that it was realised that no previous empirical study had investigated the factors influencing cloud adoption decisions among Saudi Government Overseas Agencies. The existing studies that had attempted to investigate cloud computing adoption decisions and the factors involved had focused on a limited number of factors while neglecting the key role that other factors could play in shaping the decision to adopt cloud computing. The review of literature made it possible to establish the state of knowledge in cloud computing adoption among government overseas agencies. This led to the identification of the gap in the previous literature in relation to the subject of the study or factors to be investigated, data collection, and data analysis techniques.

In addition to the review of the literature, it was realized that the chosen research methodology was of great value to the research process as a whole. Through a combination of both qualitative interviews and quantitative surveys, the researcher was able to investigate the project to an adequate depth and breadth. In addition to deepening and broadening the understanding of the problem to a great degree, the mixed methods approach adopted in the present research enhanced the accuracy of, and confidence in, the findings of the study. As such, the findings were used to develop a cloud computing adoption model among Saudi Government Overseas Agencies.

One of the most important challenges encountered in this study was the use of SEM approach to evaluate the proposed model of cloud computing adoption. The reason is that the SEM approach requires a large sample size. In order to have reliable and robust results, SEM requires a minimum sample of 200 participants. The sample size for the present study was 226 IT staff from Saudi Government Overseas Agencies. As such, data collection was the other challenge encountered in the process of conducting the present study. The data collection was lengthy, time-consuming process that lasted for more than seven months. In order to obtain a sufficient number of participants for the quantitative phase of the study, the quantitative questionnaire was distributed through online platforms and traditional distributions of the paper-and-pencil questionnaires. In conclusion, the use of a large sample improved the generalizability of the study findings.

9.3 Future Research Direction

The study presented here serves as a foundation for future studies on the subject. The emphasis in this study was to overview possible implications of the various overseas agencies of Saudi Arabia adopting cloud technology. As the scope of this study has focused solely on cloud adoption in Saudi Arabia Government Overseas Agencies, the findings of the study are valid for Saudi Arab only. Similar to this study, future research can focus on the implications of cloud adoption in private sector and then provide a comparative analysis in both government and private sector for cloud technology. This research design and direction is applicable on other countries and other sectors as well. In future research studies, other IT technologies similar to cloud computing can be evaluated.

In this research, the relationship that is present between the cloud adoption model and different variables in adoption scenario is studied. As part of this research, key factors that can influence cloud adoption are evaluated and assessed, and in case of a future extension of this research, additional factors can also get added to the mix of variables, for instance- implications of government's role in successful adoption of cloud. One area that can benefit significantly by further research is the relationship present between policy designs and intervention from the government.

In case of this research study, only IT professionals were added as participants for their understanding of cloud computing and its technical aspects for business implementation. In future studies, additional participants can be added to look at cloud adoption process from other perspectives such as cloud service providers, business managers, and political activists to find other issues with adoption.

This study was performed in a limited time and with budgetary constraints, which caused this study to reach outcomes through limited quantitative (i.e. survey), and qualitative (i.e. qualitative) methods of data collection. While the data analysis process used a reliable multivariate method,

future studies can benefit by introducing additional methods of data collection for example- evaluating a case study or interviewing personnel from an overseas agency.

Another important aspect of this study was that it attempted to measure the acceptance of cloud computing at only organizational level. Accordingly, the scope of conducting research in future to identify implications of cloud adoption on individual level is open for future studies.

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Appendices

Appendix A Experts Interview

Interview Questions

Q1: How important is the influence of the following factors the adoption of cloud computing services in Saudi Arabia government agencies overseas? Why?

Category 1: Technology factors					
Attributes	Very important	Important	May be important	Not important	Not relevant
Service quality					
Lack of IT Standards					
System Quality					
Usefulness of the System					
Data Security					
Trust					
Privacy					

Q2: How important is the influence of the following Organisational factors to the adoption of cloud service in Saudi Arabia government agencies overseas? Why?

Category 2: Organisational factors					
Attributes	Very important	Important	May be important	Not important	Not relevant
Employees readiness					
Top Management support					
Cultural of Saudi Government Agencies overseas					
Organisation Vision					
Change Management Competencies					
Cost of Infrastructure					

Q3: If you are responsible for digital innovation within your organisation, what is the importance of the following Environmental factors to your decision to adopt cloud services? Why?

Category 3: Kingdom of Saudi Arabia Environment Factors					
Attributes	Very important	Important	May be important	Not important	Not relevant
Legislation and Policy Concerns					
Government Intervention					
KSA Culture					

Q4: In your view, what are the most Organisational/Environmental and Technological factors need to be considered when agencies adopting cloud service?

Q5: Have adopting cloud computing service in your agencies?

Q6: If you are not adopting cloud service, what are the reasons behind that?

Q7: If your agencies adopting cloud service, what are the challenges that you faced?

Appendix B Results of the Interviews

Factors	Variable	Frequency	Percentage	Valid Percent	Cumulative Percent
Service quality	important	6	60.0	60.0	60.0
	may be important	3	30.0	30.0	90.0
	Very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	
Lack of IT Standards	important	5	50.0	50.0	50.0
	may be important	2	20.0	20.0	70.0
	very important	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
System Quality	important	1	10.0	10.0	10.0
	may be important	7	70.0	70.0	80.0
	not relevant	1	10.0	10.0	90.0
	very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	
Usefulness of the System	important	7	70.0	70.0	70.0
	may be important	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

Factors	Variable	Frequency	Percentage	Valid Percent	Cumulative Percent
Data Security	important	3	30.0	30.0	30.0
	Not relevant	1	10.0	10.0	40.0
	very important	6	60.0	60.0	100.0
	Total	10	100.0	100.0	
Trust	important	4	40.0	40.0	40.0
	may be important	3	30.0	30.0	70.0
	not relevant	2	20.0	20.0	90.0
	very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	
Privacy	important	4	40.0	40.0	40.0
	may be important	2	20.0	20.0	60.0
	not relevant	2	20.0	20.0	80.0
	very important	2	20.0	20.0	100.0
	Total	10	100.0	100.0	
Employees readiness	important	6	60.0	60.0	60.0
	may be important	3	30.0	30.0	90.0
	very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	
Top Management support	important	8	80.0	80.0	80.0
	very important	2	20.0	20.0	100.0
	Total	10	100.0	100.0	
Culture of Saudi government agencies overseas	important	3	30.0	30.0	30.0

Factors	Variable	Frequency	Percentage	Valid Percent	Cumulative Percent
	may be important	3	30.0	30.0	60.0
	very important	4	40.0	40.0	100.0
	Total	10	100.0	100.0	
Organisation Vision	important	7	70.0	70.0	70.0
	very important	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
Change Management Competencies	important	5	50.0	50.0	50.0
	may be important	1	10.0	10.0	60.0
	not important	1	10.0	10.0	70.0
	very important	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
Cost of Infrastructure	important	6	60.0	60.0	60.0
	may be important	1	10.0	10.0	70.0
	very important	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
Legislation and Policy Concerns	important	6	60.0	60.0	60.0
	not important	1	10.0	10.0	70.0
	very important	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
Government Intervention	important	4	40.0	40.0	40.0
	may be important	2	20.0	20.0	60.0
	very important	4	40.0	40.0	100.0

Factors	Variable	Frequency	Percentage	Valid Percent	Cumulative Percent
	Total	10	100.0	100.0	
KSA Culture	important	4	40.0	40.0	40.0
	may be important	4	40.0	40.0	80.0
	not important	1	10.0	10.0	90.0
	very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Appendix C One-Sample Statistic

	N	Mean	Std. Deviation	Std. Error Mean
Service quality	10	3.80	.632	.200
Lack of IT Standards	10	4.10	.738	.233
System Quality	10	3.10	.994	.314
Usefulness of the System	10	3.70	.483	.153
Data Security	10	4.30	1.252	.396
Trust	10	3.20	1.317	.416
Privacy	10	3.40	1.430	.452
Employees readiness	10	3.80	.632	.200
Top Management support	10	4.20	.422	.133
Cultural of Saudi Government Agencies overseas	10	4.10	.876	.277
Organisation Vision	10	4.30	.483	.153
Change Management Competencies	10	4.00	.943	.298
Cost of Infrastructure	10	4.20	.632	.200
Legislation and Policy Concerns	10	4.10	.876	.277
Government Intervention	10	4.20	.789	.249
KSA Culture	10	3.50	.850	.269

Appendix D Stage 1 One-Sample Test

	p-value	Result
Service quality	.003	Statistically significant
Lack of IT Standards	.001	Statistically significant
System Quality	.758	Not statistically significant
Usefulness of the System	.001	Statistically significant
Data Security	.009	Statistically significant
Trust	.642	Not statistically significant
Privacy	.399	Not statistically significant
Employees readiness	.003	Statistically significant
Top Management support	.000	Statistically significant
Cultural of Saudi Government Agencies overseas	.003	Statistically significant
Organisation Vision	.000	Statistically significant
Change Management Competencies	.008	Statistically significant
Cost of Infrastructure	.000	Statistically significant
Legislation and Policy Concerns	0.003	Statistically significant
Government Intervention	0.001	Not statistically significant
KSA Culture	0.096	Statistically significant

Appendix E Questionnaire

The aim of this questionnaire is to investigate the factors that may affect an organisation to adopt cloud computing in Saudi Arabia government overseas. Agencies your replies and expertise will help in enhance the constructed the framework for the adoption of cloud computing. All information provided will be used for research objective only.

General Questions

1. **Choose the option that best reflects your years of experience:** *
   - ☐ Less than 2 years
   - ☐ 2 – 5 years
   - ☐ 6 – 10 years
   - ☐ More than 10 years

2. Have you worked on an IT project for a government organisation? *
   - ☐ Yes
   - ☐ No

3. Do you have cloud services at your organisation? *
   - ☐ Yes
   - ☐ No

4. Do you think security risks affect your organisation decision to adopt the cloud? *
   - ☐ Yes
   - ☐ No

The literature identified the following factors. To what extent do you agree with the importance of these factors in adopting the cloud services?

5 It is necessary to test the services of cloud computing before it can be applied within our organisation *****

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

6 Cloud technology is still complicated. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

7. Service Quality can support organisational performance. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

8. Cloud services should be available to support your IT operations. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

9. Having quality service (e.g., e-services) would encourage us to use cloud computing. *

- Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

10. Lack of IT standards affective the adoption decisions of cloud *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

11. Cloud service should be available to support Lack of IT standards *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

12. Should consider System Quality when adopting cloud computing.*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

13 Using cloud computing in our agencies will support us to enhance our system *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

14. Should consider the usefulness of the system when adopting cloud computing *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

15. Adopting cloud computing within our organisation will enable us to accomplish our activities timely and efficiently. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

16. In cloud computing technology, the main element to consider is the safety and security of data

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

17. A factor that could affect our demand for cloud computing can be the security concerns.*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

18. Do you agree that trust in relation to cloud computing, may be useful to identify between organisational and technological? *

- ☐ Strongly Agree

- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

19 Organisations need to trust the cloud provider that their data will not be uncovered.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

20 Cloud computing technology is dependable.*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

21 Privacy considered the major matter to any agencies that willing to use cloud computing Service *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

22. Our data which is stored through cloud computing in overseas countries can be another element of high risk issues. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

23. The employee readiness needs to be considered before using cloud technology *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

24. Information relating to IT system is a mandatory requirement before cloud computing applied within our organisation. ***

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree

- ☐ Strongly Disagree

25. Have to consider vision of organisation when making the decision of cloud service *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

26. Having vision of organisation would encourage us to use cloud computing *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

27. Approvals from the top management are required before we can install cloud computing within our organisation. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

28. Management should be concerned about the service provider's authentication systems that grant access to data. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

29. Culture of organisation should consider as important factor for any organisations when adopting cloud. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

30. The cultural aspect of each organisation is an important factor that should be taken into consideration when we use cloud technology *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

31 Before applying cloud computing, change management competencies and decisions must be critically evaluated in our organisation for its effective usage. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

32. The employee with higher competencies for planning and decision making is essential to adopt cloud computing *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

33. Standardised infrastructure helping the organisations to reduced cost *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

34 Promised commitment towards the Compliance with regulations of the cloud computing is important factor which affects our decision to use the technology. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

35. Policy with law affects our decision to use cloud services. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

36. Clearer government policy guidelines will help to enhance cloud computing adoption *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

37. Government intervention is another factor can be effect to our decision to adopting cloud services. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

38. Using cloud technology depends on the cultural of the country in the organisation. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

39. Cloud computing adoption also depends upon the culture being followed in the organisation.*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

Appendix F Results of the Questionnaire

It is necessary to test the services of cloud computing before it can be applied within our organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	18.9	18.9	18.9
	Neutral	9	24.3	24.3	43.2
	Agree	17	45.9	45.9	89.2
	Strong Agree	4	10.8	10.8	100.0
	Total	37	100.0	100.0	

Cloud technology is still complicated.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	10.8	10.8	10.8
	Disagree	15	40.5	40.5	51.4
	Neutral	13	35.1	35.1	86.5
	Agree	5	13.5	13.5	100.0
	Total	37	100.0	100.0	

Service Quality can support organisational performance.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	7	18.9	18.9	29.7
	Agree	19	51.4	51.4	81.1
	Strong Agree	7	18.9	18.9	100.0
	Total	37	100.0	100.0	

The cloud computing technology should be available to our IT services to save tasks efficiently.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	6	16.2	16.2	21.6
	Agree	25	67.6	67.6	89.2
	Strong Agree	4	10.8	10.8	100.0
	Total	37	100.0	100.0	

Having quality service would support us to use cloud computing technology.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	5	13.5	13.5	24.3
	Agree	23	62.2	62.2	86.5
	Strong Agree	5	13.5	13.5	100.0
	Total	37	100.0	100.0	

Lack of IT standards affective the adoption decisions of cloud

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	16.2	16.2	16.2
	Neutral	9	24.3	24.3	40.5
	Agree	20	54.1	54.1	94.6
	Strong Agree	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Cloud service should be available to support Lack of IT standards

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.1	8.1	8.1
	Neutral	9	24.3	24.3	32.4
	Agree	19	51.4	51.4	83.8
	Strong Agree	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Should consider System Quality when adopting cloud computing.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	16.2	16.2	16.2
	Neutral	8	21.6	21.6	37.8
	Agree	19	51.4	51.4	89.2
	Strong Agree	4	10.8	10.8	100.0
	Total	37	100.0	100.0	

Using cloud computing in our agencies will support us to enhance our system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.7	2.7	2.7
	Neutral	4	10.8	10.8	13.5
	Agree	19	51.4	51.4	64.9
	Strong Agree	13	35.1	35.1	100.0
	Total	37	100.0	100.0	

Should consider the usefulness of the system when adopting cloud computing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	7	18.9	18.9	24.3
	Agree	27	73.0	73.0	97.3
	Strong Agree	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Adopting cloud computing within our organisation will enable us to accomplish our activities timely and efficiently.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.7	2.7	2.7
	Neutral	3	8.1	8.1	10.8
	Agree	17	45.9	45.9	56.8
	Strong Agree	16	43.2	43.2	100.0
	Total	37	100.0	100.0	

In cloud computing technology, the main element to consider is the safety and security of data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	5	13.5	13.5	18.9
	Agree	15	40.5	40.5	59.5
	Strong Agree	15	40.5	40.5	100.0
	Total	37	100.0	100.0	

A factor that could affect our demand for cloud computing can be the security concerns.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	12	32.4	32.4	43.2
	Agree	14	37.8	37.8	81.1
	Strong Agree	7	18.9	18.9	100.0
	Total	37	100.0	100.0	

Trust in relation to cloud computing, may be useful to identify between organisational and technological.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	9	24.3	24.3	29.7
	Agree	20	54.1	54.1	83.8
	Strong Agree	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Organisations need to trust the cloud provider that their data will not be uncovered.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	6	16.2	16.2	16.2
	Agree	24	64.9	64.9	81.1
	Strong Agree	7	18.9	18.9	100.0

	Total	37	100.0	100.0	

Cloud computing technology is dependable.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	16	43.2	43.2	48.6
	Agree	17	45.9	45.9	94.6
	Strong Agree	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Privacy considered the major matter to any agencies that willing to use cloud computing Service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	7	18.9	18.9	24.3
	Agree	22	59.5	59.5	83.8
	Strong Agree	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Our data which is stored through cloud computing in overseas countries can be another element of high risk issues.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	10	27.0	27.0	27.0
	Neutral	6	16.2	16.2	43.2
	Agree	14	37.8	37.8	81.1
	Strong Agree	7	18.9	18.9	100.0
	Total	37	100.0	100.0	

The employee readiness needs to be taking in our consideration before adopting cloud service.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.7	2.7	2.7
	Neutral	7	18.9	18.9	21.6
	Agree	23	62.2	62.2	83.8
	Strong Agree	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Information relating to IT system is a mandatory requirement before cloud computing applied within our organisation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	7	18.9	18.9	24.3
	Agree	24	64.9	64.9	89.2
	Strong Agree	4	10.8	10.8	100.0
	Total	37	100.0	100.0	

Have to consider vision of organisation when making the decision of cloud service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.1	8.1	8.1
	Neutral	10	27.0	27.0	35.1
	Agree	21	56.8	56.8	91.9
	Strong Agree	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

Having vision of organisation would encourage us to use cloud computing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	6	16.2	16.2	27.0
	Agree	19	51.4	51.4	78.4
	Strong Agree	8	21.6	21.6	100.0
	Total	37	100.0	100.0	

Approvals from the top management are required before we can install cloud computing within our organisation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	3	8.1	8.1	13.5
	Agree	23	62.2	62.2	75.7
	Strong Agree	9	24.3	24.3	100.0
	Total	37	100.0	100.0	

Management should be concerned about the service provider's authentication systems that grant access to data.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.4	5.4	5.4
	Neutral	9	24.3	24.3	29.7
	Agree	20	54.1	54.1	83.8
	Strong Agree	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Culture of organisation should consider as important factor for any organisations when adopting cloud.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.1	8.1	8.1
	Neutral	6	16.2	16.2	24.3
	Agree	20	54.1	54.1	78.4
	Strong Agree	8	21.6	21.6	100.0
	Total	37	100.0	100.0	

The cultural aspect of each organisation is an important factor that should be Considered when we adopting cloud Service.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.1	8.1	8.1
	Neutral	8	21.6	21.6	29.7
	Agree	24	64.9	64.9	94.6
	Strong Agree	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Before applying cloud computing, change management competencies and decisions must be critically evaluated in our organisation for its effective usage.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	8	21.6	21.6	32.4
	Agree	22	59.5	59.5	91.9
	Strong Agree	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

The employee with higher competencies for planning and decision making is essential to adopt cloud computing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	13.5	13.5	13.5
	Neutral	13	35.1	35.1	48.6
	Agree	16	43.2	43.2	91.9
	Strong Agree	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

Standardised infrastructure helping the organisations to reduced cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.7	2.7	2.7
	Neutral	3	8.1	8.1	10.8
	Agree	17	45.9	45.9	56.8
	Strong Agree	16	43.2	43.2	100.0
	Total	37	100.0	100.0	

Legislation with complex policy affects our decision to use cloud services.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	6	16.2	16.2	27.0
	Agree	24	64.9	64.9	91.9
	Strong Agree	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

Promised commitment towards the Compliance with regulations of the cloud computing is another important factor which affects our decision to use the technology.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	13.5	13.5	13.5
	Neutral	9	24.3	24.3	37.8
	Agree	17	45.9	45.9	83.8
	Strong Agree	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Clearer government policy guidelines will help to enhance cloud computing adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	3	8.1	8.1	8.1
	Agree	24	64.9	64.9	73.0
	Strong Agree	10	27.0	27.0	100.0
	Total	37	100.0	100.0	

Government intervention is another factor can be effect to our decision to adopting cloud services.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	10.8	10.8	10.8
	Neutral	8	21.6	21.6	32.4
	Agree	21	56.8	56.8	89.2
	Strong Agree	4	10.8	10.8	100.0
	Total	37	100.0	100.0	

Using cloud technology depends on the cultural of the country in the organisation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.1	8.1	8.1
	Neutral	8	21.6	21.6	29.7
	Agree	24	64.9	64.9	94.6
	Strong Agree	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Cloud computing adoption also depends upon the culture being followed in the organisation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	13.5	13.5	13.5
	Neutral	8	21.6	21.6	35.1
	Agree	22	59.5	59.5	94.6
	Strong Agree	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Appendix G Stage 2 One-Sample Test

	p-value	Result
Service quality	.000	Statistically significant
Lack of IT Standards	.001	Statistically significant
System Quality	.001	Statistically significant
Usefulness of the System	.001	Statistically significant
Data Security	.000	Statistically significant
Trust	.001	Statistically significant
Privacy	.001	Statistically significant
Employees readiness	.001	Statistically significant
Top Management support	.001	Statistically significant
Cultural of Saudi Government Agencies overseas	.001	Statistically significant
Organisation Vision	.001	Statistically significant
Change Management Competencies	.001	Statistically significant
Cost of Infrastructure	.001	Statistically significant
Legislation and Policy Concerns	.001	Statistically significant
Government Intervention	.002	Statistically significant
KSA Culture	.001	Statistically significant

Appendix H Questionnaire for Evaluation Study

This study is about the adoption of cloud computing at the organisational level. The aim of this research is identify the key factors that may influence adoption of cloud computing by Saudi organisations operating overseas Thank you very much for taking part in this study. Please complete all parts of the questionnaire by selecting the option that do you think is the most appropriate from the perspective of your organisation.

Part 1 General Questions

1. Have you ever worked on an IT project for a government organisation?

☐ Yes ☐ No

2. How many years of experience do you have in IT project field?

☐ Less than 2 years ☐ 2 – 5 years

☐ 6 – 10 years ☐ More than 10 years

3. What is the sector of your organisation?

☐ Education Organisation

☐ Embassies Organisation

☐ Cultural bureaus Organisation

☐ Airlines Organisation

☐ Independent

☐ Other, please specify.....

4. Have you ever used cloud services at your work?

☐ Yes ☐ No

Part 2 Study Questions

1. To what extent do you agree with the following statements in relation to adoption of cloud services in your organisation?

Factors	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Service Quality	1. Cloud services must work accurately to ensure effective running of our systems operations.					
	2. Equipping our systems with high quality service would encourage us to strive ahead for the usage of cloud computing.					
	3. Cloud computing service enables all the time service accessibility (24/7)					

	4. Cloud computing service also enables easily accessibility through the usage of service anywhere.					
	5. An efficient backup service would definitely regard us to switch to cloud service.					
Lack of IT Standards	6. Lack of IT Standards is essential for cloud services adoption.					
	7. Lack of IT Standards affects the decision to adopt cloud services.					
	8. Cloud service should be available to support Lack of IT standards					
	9. Lack of standards could make cloud computing trickier to use.					
Usefulness of System	10. Should consider the usefulness of the system when adopting cloud computing					
	11. Usefulness of Cloud Computing technology will help and accelerate the adoption of Cloud Computing within my organisation					
	12. Usefulness of Cloud Computing allows users access to the same kinds of applications through the internet					
Data Security	13. . Database in cloud computing service not secure enough to store our agencies data.					
	14. . Traditional data base methods are more secure than cloud service.					
	15. One of the main reasons to discourage our decision of using cloud technology is security.					
	16. Benefits of cloud service less than risks.					
internet speed reliability	17. Before the application of cloud computing, it is necessary to test the internet connectivity for speed and reliability.					
	18. High Internet speed will encourage adoption of cloud service in my organisation					
	19. Cloud computing configurations should comply with high internet speed.					
Extendibility of Applications (Apps) to the cloud	20. Extendibility of Apps is a critical factor for the adoption of cloud services.					
	21. Knowing how to deal with current Apps is critical before deciding to adopt cloud computing.					

	22. Before the final implementation of cloud services, it is essential to try current extendibility of Apps to cloud to monitor their progress and effectiveness.					
	23. I would definitely go for the idea of cloud computing if it is actively applicable with most of our Apps.					
Employee Readiness	24. Employee knowledge of cloud service is required to use Cloud computing					
	25. Employee Readiness is one of the top challenges that many government organisations face when implementing the cloud services.					
	26. Using cloud computing services increases employee productivity.					
Vision of the organisation	27. It's important that my organisation have a vision to adopt cloud technology in the future.					
	28. Vision of the organisation will help us to adopt cloud computing more quickly.					
	29. It is necessary for our organisation to have a vision to know when we will adopt cloud computing.					
Top Management support	30. Involvement top management is necessary to adopt cloud service.					
	31. The important decision to adopt cloud services in our agencies depends on the last decision of top management.					
	32. Top management involvement is essential in decision making for cloud computing adoption.					
	33. Top management involvement is in reviewing cloud computing recommendations by an expert consultant.					
Culture of Saudi Government agencies overseas	34. In general, we like to try new technologies that facilitate our work.					
	35. My organisation faces some organisational culture barriers in relation to the adoption of modern technologies.					
	36. Organisational culture will not affect my organisation in adopting the Cloud Computing technology.					
Change Management Competencies	37. The idea of implementing cloud services within my organisation is in direct relation with the adoption of change management competencies ability.					

	38. Another important element to consider before the implementation of cloud computing is the adoption of change management competencies.					
	39. Leaders have to achieve change management competencies in my organisation to adopt cloud computing.					
	40. I would use cloud services if they complied with change management competencies between leadership in Saudi government organisations and government organisations overseas.					
Cost of Infrastructure	41. Cost of Infrastructure is very important factor in adopting Cloud Computing.					
	42. Ensuring a good low cost infrastructure would encourage us to use cloud technology.					
	43. Cloud services have a low degree of cost infrastructure which could facilitate cloud computing adoption.					
	44. Standardized infrastructure helping the organisations to reduced cost..					
Trust	45. I feel confident while I save my organisation's data on the cloud service.					
	46. The data of my organisation could be accessed by third party without my knowledge.					
	47. I feel assured that our data on the cloud will be protected due to adequate technological regulations.					
Privacy	48. Privacy issue is one that affects our decision to employ cloud computing.					
	49. Our organisational data on the cloud maybe exposed to unauthorised parties without our knowledge.					
	50. I would definitely encourage cloud computing within my organisation if our data was guaranteed					
	51. The cloud service providers might also be responsible for making our data available for other parties without our knowledge and permission.					
Employee Resistance	52. Cloud computing adoption may be resisted by employees because they will lose some power in the organisation.					
	53. Employee resistance is important in adopting the cloud services.					

	54. Employees who resist change can actually cripple the organisation when deciding to adopt cloud services.					
Organisation Size	55. The size of organisation is important when making the decision to adopt cloud.					
	56. The size of my organisation affects decision to adopt cloud service					
	57. Using cloud technology depends on the organisational size.					
Legislation and Policy Concerns	58. Legislation with complex policy affects our decision to use cloud services.					
	59. Legislation and policy concerns are critical issues that affect our decision to use cloud services.					
	60. Once our policy and legislation has been properly debated the organisation will adopt cloud service.					
Government Intervention	61. The government may sometimes intervene in government organisations to make a decision whether or not to adopt the cloud service.					
	62. Government intervention affects our decision to use cloud services.					
	63. Government intervention has high impact on government organisations' decision to cloud computing adoption.					
Culture of KSA	64. Another factor that would enable me to use the cloud computing is if the providers were based in Saudi Arabia.					
	65. Cloud computing could be responsible for IT employees reduction in my agencies, while, Saudi Arabia needs to encourage local IT employment.					
	66. Culture in Saudi Arabia has an impact on change management and management decisions on adopting cloud computing services					
Cloud Adoption	67. Overall, I think that using cloud computing services is advantageous					
	68. Overall, I am in favour of using the cloud computing services					
	69. I think that I would like to use the cloud computing frequently					

Thanks you very much for your time in completing the survey.

H.1 Questionnaire (Arabic version)

هذه دراسة علمية حول إعتماد الحوسبة السحابية على مستوى المكاتب السعودية في الخارج ، الهدف من هذا البحث هو دراسة العوامل التي قد تؤثرعلى قرارالمكاتب السعودية في الخارج في تبني الحوسبة السحابية في القطاع العام في المملكة العربية السعودية، سيتم استخدام جميع المعلومات المقدمة لأغراض البحث فقط.

شكرا لوقتكم الثمين على المشاركة في هذه الدراسة.

هل تود الاجابة على هذا الاستبيان ؟

نعم اوافق و اود الاجابة على هذا الاستبيان □

لا غير موافق □

الجزء الأول أسئلة عامة

1- هل سبق لك أن عملت في مشروع لتكنولوجيا المعلومات لمنظمة حكومية

نعم □ لا □

2- ما هو عدد سنوات خبرتك في مجال مشروع تكنولوجيا المعلومات؟

سنوات 5 - 2 □ أقل من سنتين □

أكثر من 10 سنوات □ سنوات 10 - 6 □

3- ما هو قطاع منظمتك؟

التعليم□

السفارات □

المكاتب الثقافية

الخطوط الجوية □

مستقل □

غير ذلك ، يرجى التحديد.....

4-هل سبق لك استخدام الخدمات السحابية في عملك؟

نعم ☐ لا ☐

الجزء الثاني أسئلة الدراسة

إلى أي مدى توافق على العبارات التالية فيما يتعلق بتبني الخدمات السحابية في منظمتك؟

العوامل	الاستبيان	اوافق بشدة	اوافق	محايد	غير موافق	غير موافق بشدة
جودة الخدمة	يجب أن تعمل الخدمات السحابية بدقة لضمان التشغيل الفعال لعمليات الأنظمة الخاصة بنا					
	تزويد أنظمتنا بخدمة عالية الجودة يشجعنا على السعي إلى الأمام لاستخدام الحوسبة السحابية					
	خدمة الحوسبة السحابية تمكن من الوصول إلى الخدمة على مدار الساعة 7/24					
	تتيح خدمة الحوسبة السحابية سهولة الوصول إليها من خلال استخدام الخدمة في أي مكان					
	من المؤكد أن خدمة النسخ الاحتياطي الفعالة ستجعلنا ننتقل إلى الخدمة السحابية بسرعة.					
نقص في معايير تكنولوجيا المعلومات	عدم وجود معايير تكنولوجيا المعلومات أمر ضروري لتبني الخدمات السحابية					
	يؤثر غياب معايير تكنولوجيا المعلومات على قرار اعتماد الخدمات السحابية					
	يجب أن تكون خدمة السحابة متاحة لدعم غياب معايير تكنولوجيا المعلومات					
	قد يؤدي الافتقار إلى المعايير إلى جعل استخدام الحوسبة السحابية أكثر صعوبة					
فائدة النظام	يجب أن تفكر في فائدة النظام عند اعتماد الحوسبة السحابية					
	سوف تساعد فائدة تكنولوجيا الحوسبة السحابية تسريع اعتماد الحوسبة السحابية داخل مؤسستي					
	تتيح فائدة الحوسبة السحابية للمستخدمين الوصول إلى نفس أنواع التطبيقات عبر الإنترنت					
أمن البيانات	قاعدة البيانات في خدمة الحوسبة السحابية ليست آمنة بما فيه الكفاية لتخزين بياناتنا					
	تعتبر أساليب قاعدة البيانات التقليدية أكثر أمانًا من الخدمة السحابية					
	أحد الأسباب الرئيسية لتقييد قرارنا باستخدام تكنولوجيا السحابة هو الأمن					

موثوقية سرعة الإنترنت	قبل تطبيق الحوسبة السحابية ، من الضروري اختبار اتصال الإنترنت وسرعتة وكذلك موثوقيته					
	ستشجع سرعة الإنترنت العالية على اعتماد الخدمة السحابية في مؤسستي					
	يجب أن تتوافق اعدادات الحوسبة السحابية مع سرعة الإنترنت العالية					
امكانية تمديد التطبيقات على السحابة	تعد إمكانية إضافة التطبيقات عاملاً مهمًا في اعتماد الخدمات السحابية					
	تعد معرفة كيفية التعامل مع التطبيقات الحالية أمرًا بالغ الأهمية قبل اتخاذ قرار باستخدام الحوسبة السحابية					
	قبل التنفيذ النهائي للخدمات السحابية ، من الضروري تجربة إمكانية التوسع الحالي للتطبيقات على السحابة لمراقبة تقدمها وفعاليتها					
	بالتاكيد سأكون مع فكرة الحوسبة السحابية إذا كانت قابلة للتطبيق بشكل فعال مع معظم تطبيقاتنا					
استعداد الموظف	معرفة الموظف بالخدمة السحابية متطلب اساسي لاستخدام الحوسبة السحابية					
	يعد استعداد الموظف أحد أهم التحديات التي تواجهها العديد من المؤسسات الحكومية عند تنفيذ الخدمات السحابية					
	يزيد استخدام خدمات الحوسبة السحابية من إنتاجية الموظفين داخل المنظمة					
رؤية المنظمة	من المهم أن يكون لدى مؤسستي رؤية لتبني تقنية الحوسبة السحابية في المستقبل					
	سوف تساعدنا رؤية المنظمة على اعتماد الحوسبة السحابية بسرعة أكبر					
	من الضروري أن تمتلك منظمتنا رؤية لمعرفة متى سنقوم باستخدام الحوسبة السحابية					
دعم الإدارة العليا	مشاركة الإدارة العليا ضرورية لتبني الخدمة السحابية					
	يعتمد قرارنا لاعتماد الخدمات السحابية في وكالاتنا على القرار الأخير للإدارة العليا					
	تعد مشاركة الإدارة العليا أمرًا ضروريًا في عملية صنع القرار في اعتماد الحوسبة السحابية					
	الإدارة العليا تعتمد في قرارها في تبني الحوسبة السحابية بناء على استشارة خبراء في هذا المجال					
ثقافة الوكالات الحكومية السعودية في الخارج	بشكل عام ، نرغب تجربة تكنولوجيات جديدة تسهل عملنا					
	تواجه مؤسستي بعض العوائق الثقافية التنظيمية فيما يتعلق باعتماد التقنيات الحديثة					
	لن تؤثر الثقافة التنظيمية على مؤسستي في اعتماد تقنية الحوسبة السحابية					

كفاءات إدارة التغيير	فكرة تنفيذ الخدمات السحابية داخل مؤسستي تعتمد على العلاقة المباشر على قدرة كفاءات إدارة التغيير					
	عنصر آخر مهم يجب مراعاته قبل تنفيذ الحوسبة السحابية هو اعتماد كفاءات إدارة التغيير					
	يتعين على القادة تحقيق كفاءات إدارة التغيير في مؤسستي لاعتماد الحوسبة السحابية					
	أود استخدام الخدمات السحابية إذا امتثلت لكفاءات إدارة التغيير بين القيادة في المؤسسات الحكومية السعودية والمنظمات الحكومية في الخارج					
تكلفة البنية التحتية	تكلفة البنية التحتية هي عامل مهم جدا في اعتماد الحوسبة السحابية					
	إن ضمان بنية تحتية منخفضة التكلفة جيدًا سيشجعنا على استخدام تقنية الحوسبة السحابية					
	تتمتع الخدمات السحابية بدرجة منخفضة من البنية التحتية للتكاليف والتي يمكن أن تسهل تبني استخدام الحوسبة السحابية					
	بنية تحتية موحدة تساعد المنظمات على خفض التكلفة					
الثقة	أشعر بالثقة أثناء حفظ بيانات منظمتي على الخدمة السحابية					
	يمكن الوصول إلى بيانات منظمتي من قبل طرف ثالث دون معرفتي					
	أشعر بالاطمئنان إلى أن بياناتنا على السحابة ستكون محمية بسبب اللوائح والتشريعات الامنية الكافية					
الخصوصية	مشكلة الخصوصية هي المشكلة التي تؤثر على قرارنا باستخدام الحوسبة السحابية					
	ربما تعرض بياناتنا التنظيمية على السحابة لأطراف غير مصرح بها دون علمنا					
	أود التأكيد على تشجيع تبني الحوسبة السحابية داخل مؤسستي إذا تم ضمان بياناتنا					
	قد يكون مقدمو الخدمات السحابية مسؤولين أيضًا عن إتاحة بياناتنا للأطراف الأخرى دون معرفتنا وإذننا					
مقاومة الموظف	قد يقاوم المستخدمين استخدام الحوسبة السحابية لأنهم سيفقدون بعض القوة في مؤسستهم					
	مقاومة الموظف مهمة في تبني الخدمات السحابية					
	الموظفون الذين يقاومون التغيير يمكن أن يحدو المنظمة في الواقع عندما تقرر اعتماد الخدمات السحابية					
حجم المنظمة	حجم المنظمة مهم عند اتخاذ قرار اعتماد السحابة					
	يؤثر حجم مؤسستي على قرار اعتماد الخدمة السحابية					
	يعتمد استخدام تقنية السحاب على الحجم التنظيمي					

						تؤثر التشريعات ذات السياسة المعقدة على قرارنا باستخدام الخدمات السحابية	**التشريعات والمخاوف المتعلقة بالسياسة**
						تشكّل التشريعات والمخاوف المتعلقة بالسياسة قضايا بالغة الأهمية تؤثر على قرارنا باستخدام الخدمات السحابية	
						بمجرد مناقشتنا لسياستنا وتشريعاتنا بشكل صحيح ، ستعتمد المؤسسة خدمة الحوسبة السحابية	
						قد تتدخل الحكومة أحيانًا في المؤسسات الحكومية لاتخاذ قرار بشأن اعتماد الخدمة السحابية أو عدم اعتمادها	**تدخل الحكومة**
						يؤثر التدخل الحكومي على قرارنا باستخدام الخدمات السحابية	
						للتدخل الحكومي تأثير كبير على قرار المؤسسات الحكومية على اعتماد الحوسبة السحابية	
						عامل آخر من شأنه تسهيل استخدام الحوسبة السحابية هو إذا كان مقدمو الخدمة في المملكة العربية السعودية	**ثقافة المملكة العربية السعودية**
						يمكن أن تكون الحوسبة السحابية مسؤولة عن تخفيض موظفي تقنية المعلومات ، بينما تحتاج المملكة العربية السعودية إلى تشجيع التوظيف المحلي لقطاع تقنية المعلومات	
						للثقافة في المملكة العربية السعودية تأثير على إدارة التغيير وقرارات الإدارة في تبني خدمات الحوسبة السحابية	
						بشكل عام ، أعتقد أن استخدام خدمات الحوسبة السحابية مفيد	**تبني الحوسبة السحابية**
						عموما ، أنا أؤيد استخدام خدمات الحوسبة السحابية	
						أعتقد أنني أود استخدام الحوسبة السحابية بشكل متكرر	

H.2 Consent form

Study title: A framework for Cloud Computing Adoption by Saudi Government agencies overseas.

Researcher name: Ahmed Albugmi

ERGO number: 27577

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (*insert date /version no. of participant information sheet*) and have had the opportunity to ask questions about the study.	
I agree to take part in this research project and agree for my data to be used for the purpose of this study.	
I understand my participation is voluntary and I may withdraw (at any time) for any reason without my rights being affected.	
Add as required	

Name of participant (print name)……

Signature of participant……

Date……

Appendix I Calculated AVE

Construct	Indicators (Measured Variables)	Factor loading	AVE	Items excluded	AVE after excluding Items
Service Quality (SQ)	Q1	0.76	0.44	Q3	0.50
	Q2	0.71			
	Q3	0.48			
	Q4	0.67			
	Q5	0.65			
Lack of IT Standards					
	Q6	0.70	0.50		
	Q7	0.66			
	Q8	0.69			
	Q9	0.77			
Usefulness of system			0.72		
	Q10	0.84			
	Q11	0.85			
	Q12	0.86			
Data Security					
	Q13	0.79	0.55		
	Q14	0.75			
	Q15	0.69			
	Q16	0.74			
Internet Speed Reliability			0.57		
	Q17	0.73			
	Q18	0.83			
	Q19	0.69			
Extendibility of Application to the cloud			0.45		
	Q20	0.71			

	Q21	0.69			
	Q22	0.54			
	Q23	0.73			
Employee Readiness					
	Q24	0.77	0.52		
	Q25	0.71			
	Q26	0.68			
Vision of Organization					
	Q27	0.80	0.57		
	Q28	0.83			
	Q29	0.61			
Top Management Support			0.41	Q32	0.54
	Q30	0.73			
	Q31	0.71			
	Q32	0.11			
	Q33	0.76			
Culture of Saudi Gov't Agencies Overseas			0.69		
	Q34	0.85			
	Q35	0.83			
	Q36	0.82			
Change Management Competences					
	Q37	0.70	0.51		
	Q38	0.76			
	Q39	0.68			
	Q40	0.72			
Cost of Infrastructure					
	Q41	0.78	0.45	Q44	0.53
	Q42	0.67			
	Q43	0.73			

	Q44	0.46			
Trust			0.57		
	Q45	0.83			
	Q46	0.78			
	Q47	0.64			
Privacy					
	Q48	0.48	0.48	Q48	0.57
	Q49	0.75			
	Q50	0.76			
	Q51	0.75			
Employee Resistance			0.64		
	Q52	0.86			
	Q53	0.84			
	Q54	0.70			
Organization size			0.77		
	Q55	0.84			
	Q56	0.91			
	Q57	0.88			
Legislation and Policy Concerns			0.59		
	Q58	0.84			
	Q59	0.80			
	Q60	0.65			
Government Intervention			0.71		
	Q61	0.85			
	Q62	0.83			
	Q63	0.84			

Culture of KSA			0.64		
	Q64	0.81			
	Q65	0.85			
	Q66	0.74			
Cloud Computing Adoption		5.78	0.66		
	QQQ1	0.83			
	QQQ2	0.80			
	QQQ3	0.81			

Appendix J Composite reliability analysis of the latent constructs

Construct	Indicators (Measured Variables)	Factor loading	Error variance	CR
Service Quality (SQ)	Q2	0.71	0.50	0.79
	Q3	0.48	0.77	
	Q4	0.67	0.55	
	Q5	0.65	0.58	
Lack of IT Standards				
	Q6	0.70	0.51	0.80
	Q7	0.66	0.56	
	Q8	0.69	0.52	
	Q9	0.77	0.41	
Usefulness of system				0.88
	Q10	0.84	0.30	
	Q11	0.85	0.28	
	Q12	0.86	0.26	
Data Security				
	Q13	0.79	0.38	0.83
	Q14	0.75	0.43	
	Q15	0.69	0.52	
	Q16	0.74	0.46	
Internet Speed Reliability				0.80

	Q17	0.73	0.47	
	Q18	0.83	0.31	
	Q19	0.69	0.52	
Extendibility of Application to the cloud				0.76
	Q20	0.71	0.50	
	Q21	0.69	0.53	
	Q22	0.54	0.71	
	Q23	0.73	0.46	
Employee Readiness				
	Q24	0.77	0.40	0.77
	Q25	0.71	0.50	
	Q26	0.68	0.53	
Vision of Organization				
	Q27	0.80	0.36	0.80
	Q28	0.83	0.30	
	Q29	0.61	0.62	
Top Management Support				0.69
	Q30	0.73	0.47	
	Q31	0.71	0.49	
	Q32	0.11	0.99	
	Q33	0.76	0.42	
Culture of Saudi Gov't Agencies Overseas				0.87
	Q34	0.85	0.28	

	Q35	0.83	0.30	
	Q36	0.82	0.33	
Change Management Competences				
	Q37	0.70	0.51	0.81
	Q38	0.76	0.43	
	Q39	0.68	0.53	
	Q40	0.72	0.49	
Cost of Infrastructure				0.76
	Q41	0.78	0.39	
	Q42	0.67	0.56	
	Q43	0.73	0.46	
	Q44	0.46	0.79	
				0.80
	Q45	0.83	0.31	
	Q46	0.78	0.39	
Trust	Q47	0.64	0.59	
Privacy				0.85
	Q48	0.48	0.77	
	Q49	0.75	0.44	
	Q50	0.76	0.43	
	Q51	0.75	0.44	
Employee Resistance				0.84
	Q52	0.86	0.27	

	Q53	0.84	0.29	
	Q54	0.70	0.51	
Organization size				0.91
	Q55	0.84	0.30	
	Q56	0.91	0.17	
	Q57	0.88	0.23	
Legislation and Policy Concerns				0.81
	Q58	0.84	0.29	
	Q59	0.80	0.36	
	Q60	0.65	0.57	
Government Intervention				0.88
	Q61	0.85	0.28	
	Q62	0.83	0.30	
	Q63	0.84	0.29	
Culture of KSA				0.84
	Q64	0.81	0.34	
	Q65	0.85	0.28	
	Q66	0.74	0.45	
Cloud Computing Adoption		5.78	1.07	0.74
	QQQ1	0.83	0.31	
	QQQ2	0.80	0.36	
	QQQ3	0.81	0.35	

Appendix K Factors that explain the greatest

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	21.314	30.448	30.448	21.314	30.448	30.448
2	3.404	4.862	35.311	3.404	4.862	35.311
3	2.339	3.341	38.652	2.339	3.341	38.652
4	2.259	3.227	41.879	2.259	3.227	41.879
5	2.106	3.008	41.660	2.106	3.008	41.660
6	1.977	2.824	44.485	1.977	2.824	44.485
7	1.774	2.534	47.019	1.774	2.534	47.019
8	1.705	2.436	49.455	1.705	2.436	49.455
9	1.675	2.393	51.848	1.675	2.393	51.848
10	1.606	2.294	54.142	1.606	2.294	54.142
11	1.521	2.174	56.316	1.521	2.174	56.316
12	1.414	2.020	58.336	1.414	2.020	58.336
13	1.360	1.943	60.279	1.360	1.943	60.279
14	1.298	1.855	62.134	1.298	1.855	62.134
15	1.281	1.830	63.964	1.281	1.830	63.964
16	1.205	1.721	65.685	1.205	1.721	65.685
17	1.175	1.679	67.364	1.175	1.679	67.364
18	1.124	1.605	68.969	1.124	1.605	68.969
19	1.098	1.569	70.538	1.098	1.569	70.538
20	1.068	1.526	72.064	1.068	1.526	72.064
21	0.87	1.24	73.31			
22	0.82	1.18	74.49			
23	0.78	1.12	75.60			
24	0.76	1.09	76.69			
25	0.72	1.02	77.72			

26	0.71	1.01	78.72			
27	0.69	0.99	79.72			
28	0.67	0.96	80.67			
29	0.64	0.92	81.59			
30	0.63	0.90	82.49			
31	0.62	0.88	83.37			
32	0.56	0.81	84.18			
33	0.55	0.79	84.97			
34	0.54	0.77	85.74			
35	0.53	0.75	86.49			
36	0.50	0.72	87.21			
37	0.48	0.68	87.89			
38	0.48	0.68	88.57			
39	0.47	0.67	89.24			
40	0.44	0.63	89.87			
41	0.41	0.58	90.46			
42	0.40	0.57	91.02			
43	0.39	0.56	91.59			
44	0.38	0.54	92.12			
45	0.37	0.52	92.65			
46	0.35	0.50	93.15			
47	0.33	0.47	93.61			
48	0.32	0.45	94.07			
49	0.31	0.45	94.52			
50	0.31	0.44	94.96			
51	0.28	0.41	95.36			
52	0.27	0.39	95.75			
53	0.26	0.37	96.12			
54	0.25	0.36	96.48			
55	0.24	0.34	96.82			

56	0.23	0.33	97.14			
57	0.21	0.30	97.45			
58	0.21	0.30	97.74			
59	0.20	0.28	98.02			
60	0.19	0.27	98.29			
61	0.18	0.26	98.55			
62	0.16	0.23	98.78			
63	0.16	0.22	99.00			
64	0.14	0.20	99.20			
65	0.13	0.19	99.39			
66	0.12	0.18	99.57			
67	0.12	0.17	99.74			
68	0.10	0.14	99.88			
69	0.08	0.12	100.00			

Appendix L Descriptive Statistics for variables measuring the factors.

Factor		Measurement variables	N	Min	Max	Mean	S.D	Skewness	Kurtosis
Service Quality	Q1	Cloud services must work accurately to ensure effective running of our systems operations.	226	2.0	5.0	3.9	0.8	-0.78	0.76
	Q2	Equipping our systems with high quality service would encourage us to strive ahead for the usage of cloud computing.	226	2.0	5.0	4.0	0.9	-0.83	0.23
	Q3	Cloud computing service enables all the time service accessibility (24/7).	226	2.0	5.0	4.4	0.6	-0.69	0.46
	Q4	Cloud computing service also enables easily accessibility through the usage of service anywhere.	226	2.0	5.0	3.9	0.9	-0.62	-0.18
	Q5	An efficient backup service would definitely regard us to switch to cloud service.	226	1.0	5.0	4.0	0.8	-0.79	0.79
		Overall Quality Service Mean score				**4.0**	**0.8**		
Lack of IT Standards	Q6	Lack of IT Standards is a major barrier in cloud services adoption.	226	2.0	5.0	3.9	0.8	-0.50	-0.11
	Q7	Lack of IT Standards negatively affects the decision to adopt cloud services.	226	2.0	5.0	3.9	0.9	-0.45	-0.43
	Q8	IT standardisation will facilitate cloud computing adoption.	226	2.0	5.0	4.0	0.8	-0.80	0.66
	Q9	Lack of IT standards make cloud computing problematic to use.	226	2.0	5.0	4.0	0.8	-0.58	0.09
		Overall Lack of IT Standards Mean score				**4.0**	**0.8**		
Usefulness of Syestem	Q10	Should consider the usefulness of the system when adopting cloud computing	226	2.0	5.0	4.0	0.8	-0.67	-0.03
	Q11	Usefulness of Cloud Computing technology will help and accelerate the adoption of Cloud Computing within my organisation	226	2.0	5.0	4.2	0.7	-0.76	-0.32
	Q12	Usefulness of Cloud Computing allows users access to the same kinds of applications through the internet	226	3.0	5.0	4.1	0.6	-0.48	0.20
		Overall Usefulness of System Mean score				**4.1**	**0.7**		
Data Security	Q13	Data store in cloud computing service not secure enough to store our agencies data.	226	1.0	5.0	3.8	1.0	-0.56	-0.27
	Q14	Traditional data base methods are more secure than cloud service.	226	1.0	5.0	4.0	0.9	-0.75	0.30

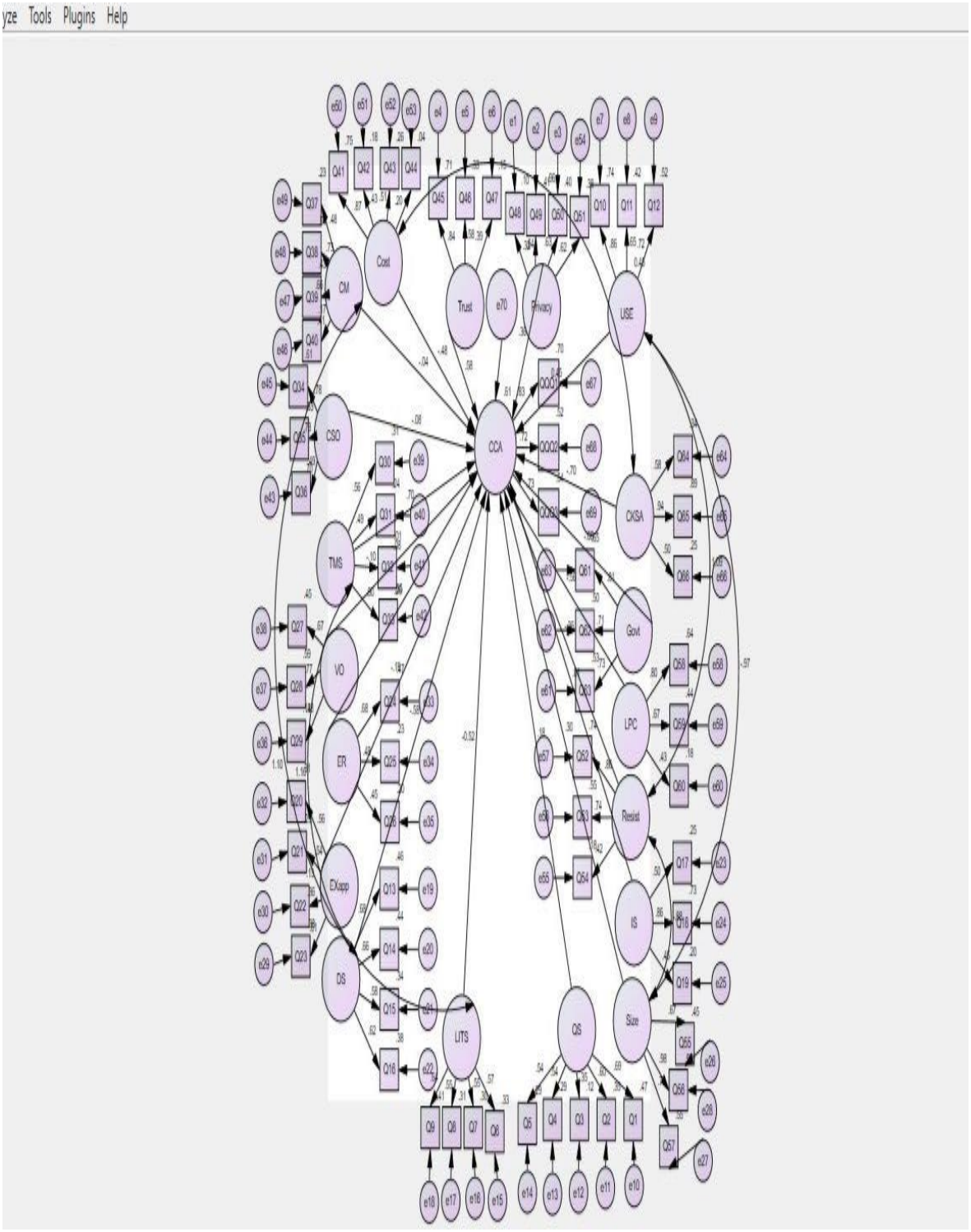
	Q15	One of the main reasons to discourage our decision of using cloud technology is security.	226	2.0	5.0	4.0	0.9	-0.72	-0.06
	Q16	Benefits of cloud service less than risks.	226	2.0	5.0	4.0	0.8	-0.60	-0.10
		Overall Data Quality Mean				**4.0**	**0.9**		
Internet Speed Reliability	Q17	Before the application of cloud computing, it is necessary to test the internet connectivity for speed and reliability.	226	1.0	5.0	2.8	1.4	-0.77	-0.17
	Q18	High Internet speed will encourage adoption of cloud service in my organisation	226	1.0	5.0	2.4	1.4	-0.97	0.88
	Q19	Cloud computing configurations should comply with high internet speed.	226	1.0	5.0	2.6	1.4	-0.73	-0.16
		Overall Internet Speed Reliability Mean score				**2.6**	**1.4**		
Extendibility of Application to the cloud	Q20	Extendibility of Apps is a critical factor for the adoption of cloud services.	226	2.0	5.0	4.0	0.9	-0.65	-0.16
	Q21	Knowing how to deal with current Apps is critical before deciding to adopt cloud computing.	226	2.0	5.0	4.1	0.8	-0.71	0.20
	Q22	Before the final implementation of cloud services, it is essential to try current extendibility of Apps to cloud to monitor their progress and effectiveness.	226	1.0	5.0	4.4	0.7	-1.12	2.06
	Q23	I would definitely go for the idea of cloud computing if it is actively applicable with most of our Apps.	226	2.0	5.0	4.0	0.8	-0.43	-0.33
		Overall Extendibility of Application to the cloud Mean				**4.1**	**0.8**		
Employee Readiness	Q24	Employee knowledge of cloud service is required to use Cloud computing	226	1.0	5.0	3.9	0.9	-0.99	0.86
	Q25	Employee Readiness is one of the top challenges that many government organisations face when implementing the cloud services.	226	2.0	5.0	4.0	0.8	-0.63	0.38
	Q26	Employee readiness is essential prior to decision to adopt cloud computing.	226	1.0	5.0	3.8	0.9	-0.75	0.45
		Overall Employee Readiness Mean score				**3.9**	**0.9**		
Vision of Organisation	Q27	It is important that my organisation have a vision to adopt cloud tech1logy in the future.	226	1.0	5.0	4.2	0.9	-1.12	1.33
	Q28	Vision of the organisation will help us to adopt cloud computing more quickly.	226	2.0	5.0	4.1	0.8	-0.76	0.24
	Q29	It is necessary for our organisation to have a vision to k1w when we will adopt cloud computing.	226	2.0	5.0	3.9	0.8	-0.62	0.42
		Overall Vision of Organisation Mean score				**4.0**	**0.8**		

Top Management Support	Q30	Involvement top management is necessary to adopt cloud service.	226	1.0	5.0	4.0	0.8	-0.63	0.28
	Q31	The important decision to adopt cloud services in our agencies depends on the last decision of top management.	226	1.0	5.0	4.1	0.9	-0.89	0.62
	Q32	Top management involvement is essential in decision making for cloud computing adoption.	226	2.0	5.0	4.2	0.7	-0.55	0.19
	Q33	Top management involvement is in reviewing cloud computing recommendations by an expert consultant.	226	1.0	5.0	3.9	0.9	-0.83	0.71
		Overall Top Management Support Mean score				**4.0**	**0.8**		
Culture of Saudi Gov't Agencies Overseas	Q34	In general, we like to try new technologies that facilitate work.	226	1.0	5.0	3.7	1.3	-0.83	0.36
	Q35	My organisation faces some organisational culture barriers in relation to the adoption of modern technologies.	226	1.0	5.0	3.6	1.2	-0.52	-0.04
	Q36	Organisational culture will not affect my organisation in adopting the Cloud Computing technology.	226	1.0	5.0	3.5	1.3	-0.55	-0.22
		Overall Culture of Saudi Gov't Agencies Overseas Mean				**3.6**	**1.3**		
Change Management Competences	Q37	Another important element to consider before the implementation of cloud computing is the adoption of change management competencies.	226	2.0	5.0	3.9	0.9	-0.86	0.06
	Q38	The idea of implementing cloud services within my organisation is in direct relation with the adoption of change management competencies ability.	226	2.0	5.0	3.7	1.0	-0.49	-0.90
	Q39	Leaders have to achieve change management competencies in my organisation to adopt cloud computing.	226	2.0	5.0	3.9	0.9	-0.63	-0.18
	Q40	I would use cloud services if they complied with change management competencies between leadership in Saudi government organisations and government organisations overseas.	226	1.0	5.0	3.8	0.9	-0.78	0.35
		Overall Change Management Competences Mean				**3.8**	**0.9**		
Cost of Infrastructure	Q41	Cost of IT Infrastructure is very important factor in adopting Cloud Computing	226	2.0	5.0	4.0	0.9	-0.87	0.07
	Q42	Ensuring a good low cost IT infrastructure would encourage us to use cloud tech1logy.	226	1.0	5.0	3.7	0.9	-0.51	0.14
	Q43	Cloud services have a low degree of costs involved in IT infrastructure, which could facilitate cloud computing adoption.	226	1.0	5.0	3.9	0.9	-0.83	0.54

	Q44	Standardized IT infrastructure could help organizations to reduce cost by adopting Cloud computing.	226	2.0	5.0	4.0	0.7	-0.65	0.63
		Overall Cost of Infrastructure Mean score				**3.9**	**0.9**		
Trust	Q45	I feel confident while I save my organisation's data on the cloud service.	226	1.0	4.0	2.6	1.1	-0.61	0.17
	Q46	The data of my organisation could be accessed by third party without my knowledge..	226	1.0	4.0	2.7	1.1	-0.79	0.23
	Q47	I feel assured that our data on the cloud will be protected due to adequate tech1logical regulations.	226	1.0	4.0	2.3	1.0	-0.68	0.25
		Overall Trust Mean score				**2.5**	**1.1**		
Privacy	Q48	Privacy issue is one that affects our decision to employ cloud computing.	226	2.0	5.0	4.1	0.7	-0.64	0.52
	Q49	Our organisational data on the cloud maybe exposed to unauthorised parties without our knowledge.	226	1.0	5.0	3.8	1.0	-0.55	-0.04
	Q50	I would definitely encourage cloud computing within my organisation if our data was guaranteed	226	1.0	5.0	4.0	1.0	-1.00	0.42
	Q51	The cloud service providers might also be responsible for making our data available for other parties without our knowledge and permission.	226	1.0	5.0	3.9	1.1	-0.90	0.00
		Overall Privacy Mean score				**3.9**	**0.9**		
Employee Resistance	Q52	Cloud computing adoption may be resisted by employees because they will lose some power in the organisation.	226	2.0	5.0	4.2	0.7	-0.64	0.22
	Q53	Employee resistance negatively affects the decision for cloud computing adoption .	226	2.0	5.0	4.2	0.5	-0.40	-0.52
	Q54	Employees who resist change can severely oppose organisational decision to adopt cloud computing.	226	2.0	5.0	4.4	0.7	-0.74	0.34
		Overall Employee Resistance Mean score				**4.3**	**0.6**		
Organization size	Q55	The size of organisation is important when making the decision to adopt cloud.	226	2.0	5.0	3.7	0.7	-0.70	0.13
	Q56	The size of my organisation affects decision to adopt cloud service	226	2.0	5.0	4.0	0.8	-0.53	-0.11
	Q57	Using cloud technology depends on the organisational size.	226	1.0	5.0	3.8	0.8	-0.95	0.75
		Overall Organisation size Mean score				**3.8**	**0.8**		
Legislation and	Q58	Legislation with complex policy affects our decision to use cloud services.	226	2.0	5.0	2.9	1.3	-0.65	0.43

Policy Concerns	Q59	Legislation and policy concerns are critical issues that affect our decision to use cloud services.	226	1.0	5.0	2.9	1.4	-1.00	0.42
	Q60	Once our policy and legislation has been properly debated the organisation will adopt cloud service.	226	1.0	5.0	2.9	1.5	-0.83	0.54
		Overall Legislation and Policy Concerns Mean score				**2.9**	**1.4**		
Government Intervention	Q61	The government may sometimes intervene in government organisations to make a decision whether or not to adopt the cloud service.	226	2.0	5.0	3.9	0.9	-0.47	-0.41
	Q62	Government intervention affects our decision to use cloud services.	226	2.0	5.0	3.9	0.8	-0.47	-0.21
	Q63	Government intervention has high impact on government organisation's decision to cloud computing adoption.	226	1.0	5.0	4.1	0.9	-0.89	0.62
		Overall Government Intervention Mean score				**4.0**	**0.9**		
Culture of KSA	Q64	Another factor that would enable me to use the cloud computing is if the providers were based in Saudi Arabia.	226	1.0	5.0	3.8	1.0	-0.70	-0.20
	Q65	Cloud computing could be responsible for IT employees reduction in my agencies, while, Saudi Arabia needs to encourage local IT employment.	226	2.0	5.0	4.0	0.9	-0.87	0.07
	Q66	The national culture has an important impact on change management and management decisions on adopting cloud computing services	226	2.0	5.0	3.9	0.9	-0.79	0.11
		Overall Culture of KSA Mean score				**3.9**	**0.9**		
Cloud Computing Adoption	QQQ1	Overall I think that using cloud computing services is advantageous	226	1.0	5.0	3.3	1.5	-0.75	0.58
	QQQ2	Overall, I am in favour of using the cloud computing services	226	1.0	5.0	4.0	1.4	-0.50	0.08
	QQQ3	I think that I would like to use the cloud computing frequently	226	1.0	5.0	3.4	1.5	-0.21	-0.34
		Overall Cloud Computing Adoption Mean score				**3.6**	**1.5**		

Final structural model in AMOS



Appendix M Correlation coefficients for the association between factors of study

	QS	LITS	USE	DS	IS	Exapp	ER	VO	TMS	CSO	CM	COST	TRUST	PRIVACY	RESIST	SIZE	LPC	GOVT	CKSA
QS	1																		
sig(2-tailed)																			
LITS	0.34	1.00																	
sig(2-tailed)	.000																		
USE	0.21	0.09	1.00																
sig(2-tailed)	.000	.067																	
DS	0.22	0.45	0.16	1.00															
sig(2-tailed)	.000	.001	0.007																
IS	0.35	0.02	0.04	0.07	1.00														
sig(2-tailed)	.000	.096	.619	.261															
Exapp	0.03	0.44	0.42	-0.40	0.36	1.00													
sig(2-tailed)	.280	.000	.001	.007	.000														
ER	0.18	0.01	0.50	0.48	0.01	0.13	1.00												

sig(2-tailed)	.097	.619	.000	.000	.450	.000													
VO	0.52	0.45	0.04	0.16	0.05	0.11	0.23	1.00											
sig(2-tailed)	.000	.000	.610	.078	.180	.093	.000												
TMS	0.06	-0.23	0.20	0.40	0.21	0.11	0.30	0.19	1.00										
sig(2-tailed)	.876	.000	.000	.000	.000	.067	.000	.340											
CSO	0.32	0.60	0.40	0.28	0.07	0.10	0.19	0.13	0.10	1.00									
sig(2-tailed)	.000	.000	.000	.078	0.21	.447	.089	890	082										
CM	0.24	0.53	0.09	0.19	0.15	0.06	0.22	0.14	0.17	0.08	1.00								
sig(2-tailed)	.045	.000	.432	.067	.120	.067	.003	.045	.034	.560									
COST	0.42	0.43	0.39	0.34	0.32	0.17	0.36	0.26	0.30	0.16	0.23	1.00							
sig(2-tailed)		.000	.000	.000	.000	.064	.000	.000	.000	.071	.000								
TRUST	-0.13	-0.33	0.50	0.45	0.28	-0.04	-0.15	-0.08	-0.09	-0.04	-0.05	-0.15	1.00						
sig(2-tailed)		.000	.000	.000	.000	.096	.010	.045	.070	.170	.549	.045							
PRIVACY	0.35	0.02	0.17	0.39	0.10	0.06	0.15	0.09	0.13	0.09	0.10	0.20	- 0.04	1.00					

sig(2-tailed)		.273	.003	.000	.004	.098	.006	.330	.003	.045	.001	.000	.302						
RESIST	0.08	0.03	-0.55	-0.40	-0.01	-0.04	-0.02	-0.01	-0.01	0.14	-0.01	0.02	- 0.02	0.01	1.00				
sig(2-tailed)		.170	.000	.000	.360	.280	.150	.263	.005	.000	.230	0.341	.220	.560					
SIZE	-0.15	-0.08	0.78	-0.06	0.04	-0.01	-0.12	-0.02	0.01	-0.27	-0.02	0.30	0.04	-0.01	- 0.86	1.00			
sig(2-tailed)		.109	.000	.067	.692	.148	.000	.273	.259	.000	.220	.000	.098	.109	.000				
LPC	0.13	0.45	0.05	0.01	0.01	0.07	0.12	0.09	0.07	0.02	0.01	0.11	- 0.06	0.04	- 0.03	0.04	1.00		
sig(2-tailed)	.005	.000	.310	.101	.404	.673	.045	.470	.328	.138	.180	.004	.552	.071	.109	.619			
GOVT	0.23	0.34	-0.03	-0.60	0.08	0.15	0.30	0.26	0.27	0.08	0.17	0.37	- 0.04	0.13	- 0.06	-0.01	0.13	1.00	
sig(2-tailed)	.001	.020	.543	.000	.343	.080	.000	.000	.000	.650	.412	.000	.589	.040	0.124	.414	.004		
CKSA	0.43	0.56	-0.02	-0.21	0.01	0.15	0.31	0.23	0.27	0.16	0.21	0.57	- 0.08	0.16	- 0.01	-0.02	0.13	0.45	1.00
sig(2-tailed)	.000	.000	.534	.000	.657	.563	.000	.000	.002	.003	.050	.000	.253	.003	.347	.610	.490	.000	

- **Key to the table**

Service Quality (SQ); Lack of IT Standards (LITS); Usefulness of system (Use): Data Security (DS);

Internet Speed Reliability(IS);Extendibility of Application to the cloud (Exapp);Employee Readiness(ER);Vision of Organization(VO);Top Management Support(TMS); Culture of Saudi Gov't Agencies Overseas(CSO);Change Management Competences(CM);Cost of Infrastructure(Cost);Trust; Privacy; Employee Resistance(ER);Organization size(Size);Legislation and Policy Concerns(LPC);Government Intervention (Govt);Culture of KSA(CKSA)