Factors Affecting the Adoption of Cloud Computing in Saudi Arabia's Government Sector

Majed Alsanea

BSc, MSc

Goldsmiths College

Department of Computing

University of London

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ABSTRACT

In an economic recession, cloud computing technology can play a significant role in public organisations and private sector companies since it decreases the cost of using information technology (IT) services besides offering several other benefits. Cloud computing technology is not currently used extensively in the public sector organisations, specifically in the case of Saudi Arabia for various reasons and factors. The aim of this study is to identify and understand these factors that may affect the adoption of cloud computing in the Saudi government sector; to understand the theoretical background of this problem by proposing a conceptual model; and to help and guide the Saudi government organisations to adopt cloud computing by proposing a practical implementation roadmap.

This study has used a mixed-method research approach which consists of two phases in collecting and analysing the data. The first phase, an online survey was conducted and theoretically designed based on the literature survey. 169 respondents participated from four government organisations, the educational sector, and independent consultants. The quantitative analyses of the data were processed from descriptive and one-way frequency statistics to inferential and regression analysis. Nineteen hypotheses were tested. The quantitative data were analysed to identify the factors that may affect the adoption of cloud computing and to measure the significance of these factors. Based on that, the hypotheses of this research were tested and verified.

The second phase, a qualitative study was conducted by using a multiple case study approach. The qualitative data were collected by conducting interviews with key people in the government organisations in order to analyse deeply and understand the nature of the problem then to find the potential solution that will lead to the adoption of cloud computing. Four Saudi organisations were chosen to participate in this study. The data were analysed by using a thematic analysis approach. The examined factors were classified into three main categories: the organisational and technological context; the environmental and external pressures; and the perceived benefits.

This study contributes to the knowledge by: conducting a comprehensive survey of the literature that lead to identifying the potential factors that may affect the adoption of cloud computing; the study also found a theoretical model lacking that addressed the influences and challenges in the adoption of cloud computing and proposes a novel conceptual model that helps to better understand these factors; moreover, a practical

roadmap is developed to guide the government organisations to adopt cloud computing in an effective efficient way in order to bridge the gap between theory and practice.

The findings of this study are sequentially divided into two stages. In the first stage, the quantitative data were analysed to identify the factors that may effect on the adoption of cloud computing and to measure the significance of these factors. Based on that, the hypotheses of this research were tested and verified. In the second stage, a qualitative data were collected by conducting interviews with key people in the government organisations in order to dig deeply and understand the nature of the problem, and to find the potential solution that will lead to adopt the cloud computing.

DECLARATION

This study is my own work and some of the results and works contained herein have been published, presented, and submitted in the following forms:

Journal Papers

1. Majed Alsanea, Jennifer Barth, “Factors Affecting the Adoption of Cloud Computing in the Government Sector: A Case Study of Saudi Arabia”, Journal of Computer Science and Information Technology. (**Published**)

2. Majed Alsanea, Jennifer Barth, David Wainwright, "A Review of Cloud Computing Technology: IS Theories and Models – A Government Organisation's Perspective", Information Processing & Management. (**Submitted**)

3. Majed Alsanea and David Wainwright "Identifying The Determinants Of Cloud Computing Adoption In A Government Sector – A Case Study Of Saudi Organisation”, "International Journal of Business and Management Studies", Vol 6, No 2, 2014 ISSN: 1309-8047 (Online), October 2013. (**Published**)

4. Hosam F. El-Sofany, Majed Alsanea, and Khalid F. Al-Otaibi, "Data Exchange Model of Patient Records in Kingdom of Saudi Arabia Using Cloud Computing," International Journal of Innovation, Management and Technology vol. 3, no. 5, pp. 580-589 , 2012. (**Published**)

Conference Papers

5. Majed Alsanea, David Wainwright "Investigating the Main Factors Effecting Cloud Computing Adoption" 7th Saudi Students Scientific Conference-UK, Feb 2014.

6. Majed Alsanea, David Wainwright "Identifying the Determinants of Cloud Computing Adoption in the Saudi Government Sector", The Third International Conference on Business, Management, Economics and Finance", October 2013.

7. Majed Alsanea, "Developing a Decision Framework for Cloud Computing Adoption in a Government Sector", UK Academy for Information System conference, Oxford University, PhD Consortium, Feb 2013.

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1 INTRODUCTION

"Seek knowledge from the cradle to the grave"

An introduction to the present research is given in this chapter. Sections 1.1 and 1.2 describe cloud computing technology and the background of the research work. The research questions are listed in section 1.3 and Section 1.4 contains the fundamental research question which is the basis of this study. The importance of this research work as described in sections 1.5 and section 1.6 explains the context of the research. An overview of the thesis is presented is section 1.7 and a summary of this chapter is given in the final section.

1.1 Introduction to the Study

> *"Governments around the world are actively looking into cloud computing as a means of increasing efficiency and reducing cost", (Kevin, 2011)*

Cloud computing is a relatively a new concept in the computing world and represents the emergence of a new computing paradigm (Vaquero et al. 2008; Buyya et al. 2009; Cegielski et al. 2012). Cloud computing has emerged as a potentially new and booming topic for the innovation of IT field (Castells 2001). The most widely used definition of Cloud computing is:

> *" A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be provided quickly and released with minimal management effort or service provider interaction " (Peter & Tim 2010).*

The future of computing is said to lie in cloud computing technology, where the main objective is to reduce the cost of IT while increasing productivity, availability, reliability, and flexibility and minimizing response times (Brian 2008). It has been reported by (Hofmann, 2008) that the majority of organisations around the globe tend to invest between 1 to 5 per cent of their revenue on IT infrastructure, and many other organisations spend huge sums of money on information system (IS) implementation projects; and this is also true of the public sector.

One of the major issues faced by large government organisations is the spending of huge sums on IT infrastructure. A prominent example is the government of Saudi Arabia, which spent around 4 billion GBP in 2010 and has been forecast that total spending for 2011 might increase by a further 10.2%. However, actual expenditures on IT infrastructure can be significantly slashed (P Hofmann 2008) with the help of cloud computing and organisations can then concentrate on their core business. It has been observed that most organisations tend to pay for many more resources than they actually need, and therefore it would be better to utilise cloud computing so that organisations pay only for the resources they utilise.

A study conducted by Gartner (Mc Donald and Aron, 2013) showed that in 2013 global IT executives considered cloud computing technology to be one of the top five most valuable technologies. Spending on software as a service (SaaS) by companies is likely to increase by 77% in the next two years. This will represent about 18% of public spending on computing technologies in the whole world, and in 2017, the total expenditures will be about $134 billion (Anderson et al., 2013). Companies can source software solutions and computing infrastructure from the cloud on a temporary basis using the cloud computing technology, and cloud providers allow them access to the services over the network (Mell and Grance, 2011). IT outsourcing can save money and provide access to technical information (Leimeister et al., 2010). Resource efficiency, flexibility and risk transference are also provided by cloud computing technology (Armburst et al. 2010). It also decreases the consumption of energy (Bose and Luo, 2011) due to the use of a combined configuration of the resources for computing, on-demand automatic scalability and the pay per need model of pricing (Mell and Grance, 2011). Cloud computing technology significantly decreases the cost to government organisations of using IT services, and this makes the adoption of this in the public sector more attractive. The cloud computing technology is being utilised by the companies which require computing resources to meet their computing requirements.

The body of social and political theory and practice that is not applicable to the context of this study because this study aimed to Saudi context which as a unique and different practise and it difficult to be generalises.

Several factors have to be considered when government organisations intend to adopt cloud computing technology. In the case of adopting any new technology without conducting a prior study, it would be financially harmful. To make a correct decision, a government has to consider all the factors involved in the adoption of the cloud computing technology and this research helps the Saudi government to understand the nature of the problem that preventing the government organisations from adopting the cloud computing.

1.2 Research Background

Cloud computing technology is relatively new in the field of information technology (IT) and many big businesses with large IT infrastructures and systems have not been able to take advantage of this technology because of certain technological, cultural, and organisational and problems that have to be solved by conducting a study that analyses the challenges faced by the adoption of the cloud computing technology in the public sector organisations.

The cloud computing technology is being used by small and medium-sized firms because it provides them with easy access to IT-related resources and is also quite affordable. However, the problems faced in the adoption of cloud computing technology by big firms and organisations different from these encountered by the small and medium organisations (Kim et al., 2009). The main problems faced by large organisations are related to financial, technical, operational and organisational issues (McKinsey and Co., 2009).

When an organisation adopts a new technology, many changes often take place in that organisation so that its performance level can be maintained or improved (Damanpour and Schneider, 2006). When cloud computing technology is adopted it changes the work carried out by staff, the IT processes used and the capabilities of the organisation, which consist of a collection of procedures used for exploiting the resources available to the firm internally and externally (Ranganathan and Balagi, 2007). Organisational capabilities increase when a new technology is adopted and these capabilities play a vital role in the adoption of the new technology (Chen, 1996). The practices and capabilities of the firm which aid the adoption of cloud computing technology are not clearly understood. Many scholars think that not all IT processes can be carried out using cloud computing technology, but many users of the technology think that it provides a different method of performing IT-related operations (Creeger, 2009).

The main objective of cloud computing technology is to reduce the cost to organisations of IT and to provide them with control over their datacentres. Despite the fact that the technology itself is not new, cloud computing is a new industry, and there are only a few procedures and standards to guide organisations through the hazards of implementation (Jackson 2011). In addition, there is a lack of exploratory studies that explain the diffusion and adoption of cloud computing especially this technology has been changing rapidly.

Various factors affecting the adoption of cloud computing have been cited in previous studies, and these can be categorised as organisational, technological, or environmental. Thus, it is feasible to apply the technology-organisation-environment (TOE) framework and Lacovou et al.'s model to understand the determinants of the adoption of cloud computing. Most previous studies have shown the importance of technological factors, whereas, the influence of environmental, technological and organisational factors varies across different industrial contexts. As a result, it is essential to identify and evaluate the key determinants of cloud computing adoption in different contexts to gain a more comprehensive understanding. In this study, the government sector is targeted.

The practices and capabilities which influence the adoption of cloud computing technology have to be considered before the cloud computing technology can be fully integrated into the public sector organisations in Saudi Arabia. This study analyses the capabilities of public sector organisations and their level of readiness so that a conceptual model can be developed to help these governmental organisations adopt cloud computing technology.

A comprehensive understanding and investigation study will be conducted to help the government organisation to realise the reasons for not adopting yet the cloud computing and to guide them to better adoption process in an efficient way. The goal of the study is to provide insights into what is required in the government sector to adopt the cloud computing technology. Little research has so far been conducted which examines the factors involved in affecting the intention of the government organisations in Saudi Arabia as a developing country.

1.3 Research Questions

1. What are the factors that may affect the government organisations in Saudi Arabia in adopting cloud computing?
2. Why the cloud computing has not yet been adopted in Saudi government organisations?
3. How government organisations in Saudi Arabia will be able to adopt cloud computing in the near future?

1.4 Aims

1. To identify and understand the factors that may effect on the adoption of cloud computing in the Saudi government sector.
2. To understand the theoretical background of the problem by proposing a conceptual model for the adoption of cloud computing in Saudi Arabia.
3. To help and guide the government organisation in Saudi Arabia to adopt the cloud computing by proposing a practical roadmap “step-by-step approach”.

1.5 Objectives

1. To identify and reviews the factors that might effect on the adoption of cloud computing.
2. To critically evaluate the current literature about adoption of cloud computing.

3. To understand the key technological, organisational, and environmental motivation and barrier issues.
4. To develop a conceptual model which will provide demonstrable benefits to organisations within the government sector.
5. To develop and propose a practical roadmap for a successful adoption.

1.6 The Significance of the Study

Problems are created in the adoption of cloud computing technology by issues of control, clouds' performance issues, latency, reliability, vendor lock-in and the lack of accepted standards all of which are barriers to the adoption of the cloud (Leavitt 2009). Users also face problems such as availability (outage) and issues of security, privacy issues, support and interoperability (Kim 2009). The process of adopting cloud computing services faces a number of difficulties, such as technological uncertainty, demand uncertainty, software functionality, institutional influence, the strategic importance of IT applications, and integration (Xin and Levina 2008). Legal issues, the availability of innovation champions within IT departments, problems in the cost benefit evaluation of cloud services, the possibility of organisational change and the choice of cloud vendors are other issues which have to be solved (Heinle and Strebel, 2010). Certain socio technical issues relating to cost, confidentiality, control, impact on work practices and limitations of business models also pose challenges when considering adoption of the cloud (Hosseini et al., 2010).

Governments face many obstacles from both external and internal sources. The funding available for the organisations is decreasing, but the need for IT-related services is steadily rising. The progress made in the field of technology has enabled the citizens to use products, which allow them to participate in the public services being provided by the government, instead of being mere consumers of these services. The capital expenditure for the implementation of new technology is not easy to find because financial resources are also required for improving the performance of the organisations to meet the high expectations, which the people have. The cost of using information technology can be reduced and the IT-related services improved only if the government implements the use of new technologies (Fontecilla, 2009).

Many users have not fully understood the cloud computing technology, and this is also one of the reasons why its adoption is being resisted in many governmental organisations. Empirical information about this new technology is needed to improve awareness so that people understand its benefits. Most of the research which has been done on this topic has focused only on the private sector, and not much attention has been given to the public sector. More studies are advised to be conducted to assess the difficulties in adopting cloud computing technology in developing nations such as Saudi Arabia, keeping in mind the influence of factors in each country in the adoption process.

The information technology infrastructure of government needs to be modified through effectively maintaining data centres, such as by virtualizing and integrating them along with operational procedures and by following the cloud business model.

The adoption of cloud computing is affected by certain key factors. The first task is to develop a sound understanding of the hurdles, challenges, and factors involved in the adoption of cloud computing. Secondly, there a conceptual model is needed for better understand of the problem, through which the government organisations could easily adopt cloud computing across the Kingdom. Moreover, government institutions would be more likely to adopt the cloud with the help of an appropriate conceptual model recommended in Chapters 3. The likely technological, organisational and environmental matters affecting its adoption will be explained and refined and through this model. Further research pertaining to cloud computing and its new techniques can be developed from the outcome of this research.

In summary, this study is significant for many reasons: Firstly, it helps the government organisations need to understand the factors that effect on the adoption of cloud computing. Secondly, it fills the gap existing in such practical studies in Saudi government sector. Thirdly, it provides a practical roadmap that will guide the government organisation step-by-step to adopt the cloud computing. Fourthly, this study has been granted to get access to the Saudi government in order to collect the required data for this research. It is well known as the most challenging issue for such studies; it is not an easy to get access to such government organisations, especially military entities. Fifthly, also this study is significant because it will add to the existing knowledge in this field and especially in the developing countries as Saudi Arabia which has a very distinctive culture.

1.7 Context of the Research

The aim of this study is to identify the factors affecting the cloud technology across Saudi government organisations. As a developing state in the Gulf region the Kingdom of Saudi Arabia has its own distinctive attributes in terms of governmental, cultural and political characteristics. The Kingdom of Saudi Arabia is the context in which this study is conducted. To discover the experiences of and practices concerning cloud computing in Saudi Arabia, a multi-method research approach integrating quantitative and qualitative techniques is applied in order to determine the issues surrounding the adoption in Saudi government organisations.

1.8 Structure of the Thesis

Chapter 1: Introduction to the Study

The background of the problem, research aims and objectives are presented in this chapter. This chapter discusses the significance of conducting this study.

Chapter 2: Literature Review

Relevant studies in the literature are investigated in this chapter and providing a comprehensive critical review about the cloud. Moreover, gaps in present knowledge are identified. The most common factors affecting the adoption of cloud computing is the main focus of this chapter. The chapter also attempts, to summarise, the prevailing literature on cloud computing currently available, besides giving an overview of the applications of the technology in various governmental organisations.

Chapter 3: Development of Conceptual Framework

A review of the literature was carried out to create a conceptual framework that includes TOE framework and the one presented by Iacovou et al. (1995). This model is considered to be a comprehensive model for embracing cloud computing in the public sector organisations.

Chapter 4: Research Methodology

A suitable and complete research methodology applied to carry out this research is chosen and explained in this chapter. Full details of research philosophy adopted, the research design process and relevant schools of thought in the field are given, and all the data collection methods and analytic tools and techniques selected are justified and explained.

Chapter 5: Survey Research Findings

In the light of findings of the cloud computing literature in Chapter 2 and initial conceptual model was developed in Chapter 3, and then based on that a survey conducted to collect the required data. These data are analysed and discussed in this chapter.

Chapter 6: Case Studies' Analysis and Findings

This chapter interpretive and analyses the case study findings in regards to the adoption of cloud computing in Saudi Arabia. In this chapter, the findings of the qualitative data are presented.

Chapter 7: Discussion and Research Synthesis

The outcomes of the data collection stages have been emphasized in this chapter. The significance of the results have been comprehensively explained and later on associated with the research objective. Also, the preliminary conceptual model offered in Chapter 3 has been emphasised with respect to improvement in this chapter along with revising it on the basis of practical findings in Chapters 5 and 6. Therefore, in chapter number 7, for understanding cloud computing adoption.

Chapter 8: Conclusions and Further Work

The final results of the study along with its implications for research and practice, its limitations, and future recommendations have been encapsulated and concluded in this chapter. The figure 1.1 has drawn the steps and composition of this study.

1.9 Chapter Summary

A picture of the research environment and the nature of the problem tackled in this study have been introduced in this chapter. The issues in the adoption of cloud computing and its challenges, and the relevant research methodologies available in the literature have been presented. The research questions, objectives and thesis structure are presented. Moreover, the significance of conducting this study was discussed. The structure of the whole thesis was presented and illustrated as well.

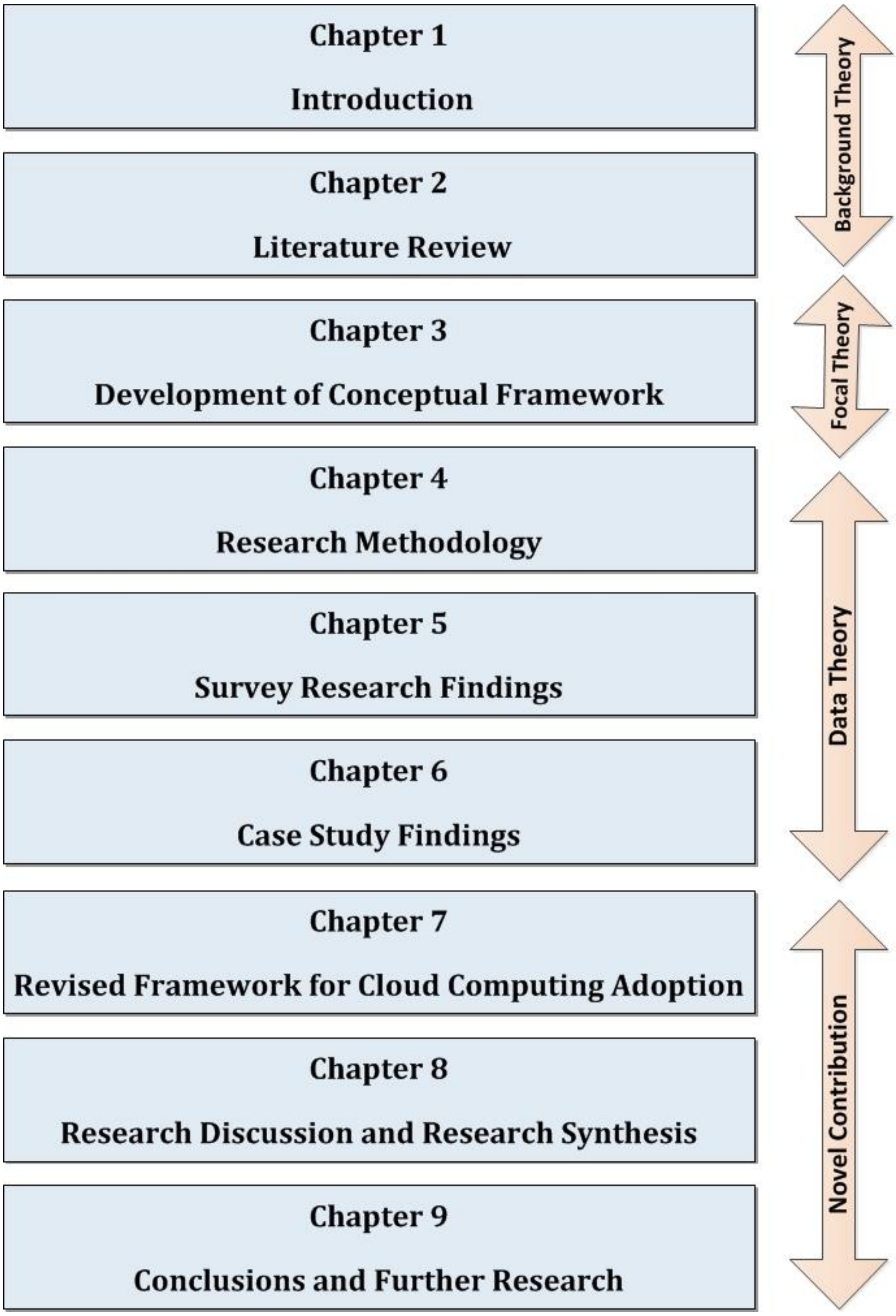


Figure 1.1: Research Structure

2 LITERATURE REVIEW

This chapter has three aims, to develop knowledge of cloud computing and identify the methods used to research it; to understand current models of IS adoption models, and of cloud computing; lastly to identify the existing gaps in knowledge. This thesis aims to fill the gaps in knowledge that are present in the current literature. A critical review is provided in this chapter of studies of the adoption of cloud computing. The published empirical and academic literature relevant to this thesis on cloud computing adoption is reviewed.

The chapter defines the cloud computing technology, describes its history and development and all of its uses and underlying advantages and disadvantages. The aspects of adoption of cloud computing and other relevant factors such as the barriers that exist when adopting the technology are discussed. The chapter also covers how cloud computing is adopted in different cultures and private companies and government organisations. Different models of IS adoption are discussed such organisational, technological, and cultural models. A critique of the relevant literature is provided followed by a summary which includes the identification of gaps in the literature.

2.1 Introduction

Cloud computing has gained much interest and popularity since its introduction in 2007 (Baker, 2007; Lohr, 2007). The main aim of this literature review is to review the theory and practice of cloud computing to help in further understanding.

2.1.1 Definition of Cloud Computing

The most widely used definition of Cloud computing is:

> *"A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be provided quickly and released with minimal management effort or service provider interaction" (Peter & Tim 2010).*

Another definition is that:

> *"It basically refers to the delivery of information technology (IT), including software, via the public internet or private networks based on Web standards"* (Mark 2012).

By 2007, the term cloud computing was a popular way of describing the online saving of data and was supported with the increased use of the internet in 2007. After that, the purchase or rental of servers and other computer equipment began to be carried out strictly on the basis of the variable demand that organisations expected according to their needs (Regalado 2011). The US National Institute for Standard and Technology (NIST) has developed a definition of cloud computing which is now accepted by all sectors of information technology and which concentrates on the technical aspects concerning step-wise and internet based datacentres of cloud computing. This definition is that:

> *"The purpose of cloud computing is to provide appropriate access to all types of computer devices and services which include software, storage, network and servers around the globe without having any intervention from the service provider side or from the side of management of the company" (Peter & Tim 2010).*

In this definition, the role of cloud computing as a platform is highlighted while the role of applications being run over this platform is not given much importance.

However, another definition such as that given by Boss et al. (2007) doesn't underestimate the importance of the applications and gives equal prominence to both the platform and applications. According to Boss et al. (2007), the task of a cloud computing platform includes de-provisioning, reconfiguration, configuration, and changing provision of servers as required, which assists in running applications in a step-wise manner with huge datacentres. The internet is used to host and use the applications because its servers on internet are very powerful. This definition also emphasizes the significance of the terminals through which applications can be accessed via the internet. These include smartphones, tablets, and laptops, PCs (Cubitt et al. 2011) and all other types of computing devices (Iyer & Henderson 2010). Other smart devices are also linked to the cloud through the internet. One example of such smart devices is coffee makers that report faults directly to the cloud via the internet (Pritchard 2012).

2.2 Understanding Cloud Computing

Cloud computing introduced in the technical and academic field in 2007 as an important new topic (By Stephen, 2007; Lohr ,2007). The recent trend in the cloud computing concentrates on the value being obtained by the customers via the management of IT infrastructure (Vouk ,2008; Etro,2009) by service providers (Gro¨nroos, 2011). However, the first phase of cloud computing deals only with the management of IT resources, which includes the automation of datacentres, the performance of networks, virtualization and other technological innovations (Armbrust et al. 2009; Boss et al. ,2007).

The basic concept of providing computing services through networking originated in the 1960s (Foster & Kesselman, 2004) before the internet had been involved (Cafaro & Aloisio, 2011; Kleinrock, 2005) and the service provision of "computer utilities" through a network is only major support function. The provision of computing services via the Internet started in the 1980s with the help of Application Service Provision (ASP) (Durkee, 2010; Owens, 2010). Instances of ASP also include net-sourcing (Allen & Thomas, 2002; T Kern et al., 2006), which concentrated on the outsourcing of computing services through the internet, but this was very short-lived. Other examples, include Hotmail, which in the 1990s outsourced services like e-mail (Owens, 2010). With the old ASPs, it was very hard to outsource computing practices and applications because they were very slow had insufficient bandwidth

(Thomas Kern et al., 2002). It became easier to outsource computing and an application since the internet is supported by high bandwidths in the form of a worldwide fibre-optic network, which has positive impacts in the form of reduced cost and better efficiency (Hogendorn, 2011). Innovations like commodity hardware virtualization (Killalea, 2008; Stanoevska-Slabeva et al., 2010), “utility computing” (Bunker & Thomson, 2006) and “grid computing” (Foster & Kesselman, 2004; Foster et al., 2008) resulted in the possibility of the provision of computing services on a huge scale and this provision was merged with the increased capability of networking in the form of the internet and dot com platforms.

A trend since then has been a change from computing using individual PCs to datacentres which are developed by large public companies in the form of public databases which can be accessed through the internet. Computing with the help of these datacentres is referred to as cloud computing. Some enormous companies such as Microsoft, Amazon and Google have developed vast commodity datacentres (Boss et al., 2007; Da Rold 2009).

Cloud computing (Carr, 2008) can also be seen as a shift from computing with individual PCs to the use of applications at the cloud (Cusumano, 2010) with the help of very large IT infrastructure (Cafaro & Aloisio, 2011). Positive and very optimistic comments regarding cloud computing have been made by industry analysts that this type of computing will revolutionise the computing industry in the near future. Research by Merrill Lynch (Lynch, 2008) estimated a market opportunity of nearly $ 160 billion. It also pointed out $95 billion and $65 billion in productivity applications and online advertisement respectively. Morgan Stanley research (Stanley, 2008) also confirms that cloud computing represents a significant trend in the technology.

2.2.1 Cloud Computing Deployment Models

Cloud computing is based on a four type of organisational hierarchy. In one model, cloud facilities are available to a group of individuals and organisations; all of whom have a common interest, and they access a common set of applications and database. This includes organisations involved in compliance, policy, security requirements and mission. Here the computing facilities might be run and owned by either one or more of the stakeholders and might be physically present in the same building.

Another model deals with individual organisations and their employees or members, which access the applications and datacentres of those particular organisations. The computers involved can also be present inside outside of organisation's own buildings and can be managed by the organisation itself or a third party. Thus, National Institute of Standards and Technology classifies cloud computing deployment models as follows (see Figure 2.1):

1. ***Private cloud:*** This cloud is designed to be used by an individual organisation having various users such as business units. The organisation itself can conduct the management of the cloud computer, or it can be managed by a third party. It can be located in or off the organisation's premises.
2. ***Community cloud:*** This is designed for particular use for a certain community of users that have the same concerns and needs such as security, policy and mission. Management and ownership can be of one or more organisations or by a run by a third party.
3. ***Public cloud:*** This is designed for public use. Its ownership and management can be handled by some business organisations or government or academic organisation. Combine a management and ownership can also exist. Its facilities have to be located in the premises of the cloud provider.
4. ***Hybrid cloud:*** This is a combination of two or more different cloud infrastructures. It can be private, public or for community use. They have different distinctive entities but share a standard technology. This allows the portability of applications and data, such as cloud bursting when load is being balanced between clouds.

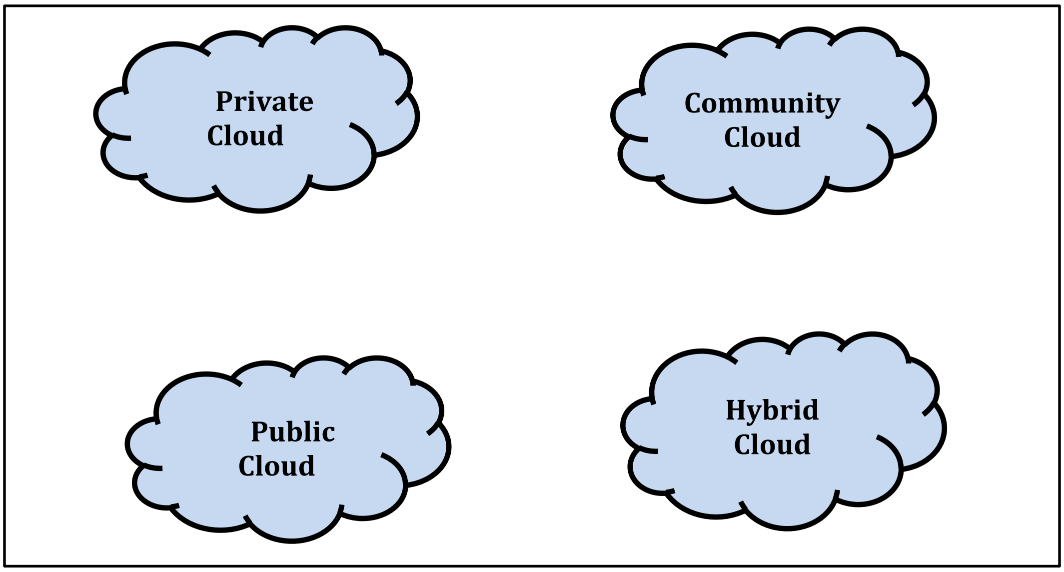


Figure 2.1: Cloud Computing Deployment Models (Peter & Tim 2010)

2.2.2 Cloud Computing Service Model

Cloud services can be categorised into three service models:

- ***Infrastructure as a Service (IaaS):*** *"The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls)"* (Peter & Tim 2010).

  This allows the users various computing resources such as storage, provision, processing, or networks. It lets the user run arbitrary software, including operating applications and systems. The user has full control of storage and operating systems. He also has a control over the applications of a certain limit of control over the networking facilities.
- ***Platform as a Service (PaaS):*** *"The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems,*

or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment" (Peter & Tim 2010).

This allows the consumer to use the infrastructure of cloud, the applications specifically created for consumer needs, and the programming language and its tools. However, the consumer cannot use and manage the fundamental infrastructure, such as the servers, networks, storage or operating systems.

- ***Software as a Service (SaaS):*** *"The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user specific application configuration settings"* (Peter & Tim 2010)..

  This allows the user to use the applications that the provider has on the cloud infrastructure. They can be accessed using different client devices or a web browser such as a web based email. The consumer however, has no access to the management of the infrastructure, which includes servers, storage, networks and operating systems.

2.2.3 Cloud Computing Governmental Models

There is no method that involves solutions and answers applicable to all situations and this has been seen in every intricate scenario. On the basis of the government organisation, there is an assortment of many government computing solutions, however; there is a range of acceptable dangers and threats connected to the private and public cloud computing offerings. To manage cloud computing models for government there are four widely utilised scenarios or models:

With the facility to utilise the Public Cloud that is the widely available cloud computing offer, the ***Government Public Cloud*** is a facility. These offers are based on the already available vendor solutions, services hosted in vendor DataCenters and technologies. In the terms of privacy, control and security point of view, this alternative might not be utilized frequently although this is the easiest way to enter cloud computing for the government from the technological perspective (Alexander, 2009). For workloads and task where the access to classified information is not necessary, this can be a widely accepted alternative. It can also be utilized in situation where only computing power is required to manage particular tasks.

The value of proposition of current public vendor offerings resembles that of the Government Public Cloud. The average price of ownership is lowered by excluding the requirement of IT infrastructure investment, system operations and management in Government Public Cloud. Additionally, for developing service availability to consumers that do not have facilities like desk fewer employees or consumers who do not have access to dedicated PCs. This option also facilitates people who do not utilize rich client based applications like task workers.

On the basis of already available vendor solutions, services hosted within vendor DataCenters and technologies, widely accessible cloud computing offer called Public Cloud is provided by ***Government Private Cloud Dedicated*** that makes all of this possible. However, this facility of Data Centre can only be utilized if it is available in that country owing to the privacy and security dilemmas. Owing to the expensive price of setting up dedicated (direct) vendor based cloud computing, every aspect of this option might not be frequently utilised utilized even though it is similar to the Government Private Cloud.

A platform where a certain Government data centre is controlled solely by a Government entity is known as ***Government Private Cloud Self-Hosted***. The hosting alternatives and options to a Government data centre are limited because of strong technical reasons like application or data integration, or IT Outsourcing is highly disapproved by the Public Sector labor union. The government has the option to optimize their own datacenters owing to the GPC self-hosted. Furthermore, the government can supply cloud services included in their shared services and operate them. The most important optimization of government shared services and datacenters price discount involves the value proposition of GPC Self-hosted (Rosenberg, 2009).

The similar or more improved level of control, data sovereignty, security, etc can be managed by the government while they are making efforts to achieve every advantage of cloud computing. Additionally, these offers are created in such a way that they would shield the already available investments of the Government in physical licenses and infrastructures. From a certain perspective, for many challenging and important government entities, this can prove to be a natural and much-needed development.

With the necessary hosting of the Private Cloud within the country owing to the security and privacy reasons or data sovereignty, the ***Government Private Cloud Hosted*** is a platform where international bandwidth is insufficient when it comes to hosting the Private Cloud to other countries. However, owing to the intricate structure of the cloud computing, an alternative of hosting private cloud at a 3rd party from the same country is available. Within every of public sector across the globe, the use of cloud computing is visible, and we can say about Cloud Computing in Government Today. In many cases, it is clear that the government will be the main area involved in the progress of cloud computing within the wider economy. The non-military utilisation of cloud computing in governments worldwide including the United States, Europe and Asia will be studied in this article. Furthermore, the resources of people and computing dilemmas that are involved in sharing to cloud computing will be examined and six-step “Cloud Migration Strategy” will be presented by the writer. This model is for governmental agencies and departments that shift to cloud computing. In the end, we view the suggestions for the information technology community as the cloud revolution developments and public sector organisations from a wider perspective (Nelson, 2009).

2.2.4 Key Characteristics of Cloud Computing

Cloud computing is emerging as a very dynamic technology that promises a revolutionary future in the field of technology. It can direct and cater to a variety of problems. The major characteristics of this type of computing are as follows (Reese, 2009; Rajkumar, 2009:

- ***Scalability:*** Adding and dropping of nodes, including the servers from the network is possible. This allows a certain limit to the changes that can be made to the infrastructure. Based on demand, its architecture can be scaled either vertically or horizontally. One of the most important key characteristic of using cloud computing is its scalability. Cloud computing allows gives the users the ability to easily upscale or downscale your technical requirements as needed and required. For example, cloud service providers allow you to manage your needs of existing IT resources to accommodate expanded business needs. This would help you to support your business growth without major changes to your current systems (Blaisdell, 2012).

- ***Flexibility:*** Users are allowed to access computing resources without the need for any human interaction. Different capabilities can be made available in immediately to scale directly up or scale out depends on the needed services. Cloud computing allows users to be more flexible to achieve their business tasks. The users of cloud computing have the ability to access data anywhere and anytime. In case if you are away from your office and need access to your data you can easily connect to your virtual network.
- ***Independence:*** The customer has little or no control over the location of the provider giving him independence of location. He can, however, have an idea of the provider's country or state.
- ***Reliability:*** The redundancy of sites allows the continuation of business activity in the case of any disaster. Reliability means is the quality of being dependable. High reliability is measured and predicted with the minimum failure or service downtime. This could be attractive to users and organisations that rely on fast responses and reliable computing. System reliability is crucial to make cloud computing successful.
- ***Cost effectiveness:*** Regardless of its deployment model, cloud implementations are vast, enjoying economies of scale. They are usually situated near power stations and cheap real estate, having reduced costs. Some authors have indicated the decrease of capital expenses as a key economic gain of cloud computing. The pay-as-you-go model, flexibility and scalability as well as the high level of virtualization of cloud computing services enable the cloud user to evade spending massively into the possession of their computing facilities in advance. Capital expenditure costs can be allocated to and controlled operating costs of contract in the computing cloud (Linthicum, 2009).

- ***Sustainability:*** This is gained by using better use of resources, more efficient systems and carbon neutrality. The cloud computing decreases carbon emissions by minimising energy IT demands. According to the some studies, offsite servers have the ability by 2020 to limit 85.7 million tons of carbon emissions. A Research conducted by Google proposed that businesses could save about 60-85 per cent on their energy expenses by turning to a cloud computing world. The environmental consequence of these significant reductions in energy is vital (Matthews, 2013).
- ***Network access:*** The network allows access to capabilities utilised by and promoted through platforms such as laptops, smartphones and PDAs. Access to resources in the cloud is accessible across multiple device kinds. It does not only cover the most common devices (laptops, Pc's, iPad's, etc.) but also smartphones, and the like. Since network bandwidth has grown, network access and scalability have also improved accordingly. Broad network access could be seen as an important enabler for cloud computing.
- ***Abstracted infrastructure:*** The exact location and type of the server which is hosted applications is unknown, but the service provider gives customers the required metrics to evaluate the accepted performance.

The five essential characteristics of cloud computing according to the NIST as follows:

- ***On-demand self-service:*** The user can start any capabilities of computing without any integration between the user and the service provider.
- ***Broad network access:*** The standard mechanisms allow the capabilities to be available on the network. This is promoted by the client platforms such as tablets PCs, laptops and mobile phones.
- ***Resource pooling:*** Different users are provided with the resources in a dynamic process of assignment based on use demand. The specific location of the computing service provider is not known to the user, but he can have an idea of its country or state.
- ***Rapid elasticity:*** Automatic adjustment of scale is applied according to demand without the user noticing the change.

- ***Measured Service:*** Cloud systems use metring for resource optimisation. The services are controlled, monitored, and managed transparency for both, the user and provider (P.Mell & T.Grance, 2011).

2.2.5 Evaluation of the Need for the Adoption of Cloud Computing

One of the main aims of cloud computing technology is for organisations to achieve reduced infrastructural costs and to gain control of their datacentres. Expenditure on IT infrastructure was previously classified as capital expenditure. However, with the help of cloud computing, such expenditure can now be classified as revenue expenditure (Nikolov, 2011). When skilled labour is a scarce resource, such as in South East Asia and similar countries, cloud computing is a very suitable technology since its use it does not require much-skilled manpower. (Luftman & Zadeh, 2011). The pay-as-you-go scheme is adopted by universities and schools (Sultan, 2010).

Environmental concerns are another reason that encourages studying this problem. The cost of electricity and cooling for the total datacentres represents almost 53% of which is basically a significant level (Zhang et al. , 2010). Cloud computing providers enjoy economies of scale in terms of software, hardware, infrastructure and bandwidth, and also benefits from the presence of a skilled labour force. Projects are usually built in or near areas where the overall costs of cooling and electricity are cheaper than in other areas. The cost is around 5 to 7 times greater if the infrastructure is set up by the organisation itself. Cloud computing is environmentally friendly with its set up (Armbrust et al., 2010). The providers use energy sources that are eco-friendly and thus improve their ''green credentials'' (Cunitt et al., 2011). However, there is some dispute regarding the costs of electricity and the services being merged. For example, Greenpeace (2010) has argued that, since they are merged, there is no way to determine the exact electricity consumption.

The use of cloud computing leads to reduced costs incurred in terms of IT expenses, equipment for infrastructure and labour. Security checks and software maintenance are the responsibility of the hosting providers, who also maintain backups of data , systems update, also any other tasks which agreed between the service provider and client (Lawrence 2011). Cloud computing meets the various demands of the users and promotes a set of computing resources. The users pay specific fees in order to gain the required services only, and this reduces the initial set up costs (Androutselis and Spinellis, 2004).

The need for cloud computing refers to the demands and requirements of technology by organisations. The management of customer data is conducted by the service provider. Cloud computing is affordable, easily available and highly efficient platform. This technology is suitable for organisations such as those in the healthcare, government or finance sectors. Data storages and business applications are more willing to switch to cloud computing. On the other hand, applications like security and management systems are less (Biddick, 2008). Therefore, data related applications tend to adopt cloud computing more that the sensitive security applications do (biddick, 2008).

2.2.6 Advantages of Cloud Computing

Lower costs benefits are one of the many advantages of cloud computing Cloud computing facilitates the consumption of computing resources according to need. Cloud computing is accessible from any device, such as laptops, mobile phones, tablets and hence is not device-dependent. It is not limited to just a computer (Jackson, 2011). There are no fixed costs for cloud computing. Therefore, less investment and lower risks are associated with it. The charges are made on the basis of usage. Companies who have varying levels of demand for the computing services as they do not have to pay so much and pay only when the need a service. Customers are provided with efficient support and sufficient security. They are given a thorough knowledge of the subject and are aware of the procedures involves. 'Agile updating' is another benefit of cloud computing. This allows the automatic updating of the system when the provider hosts any application without any planned downtime (Yang, 2012). As mentioned earlier, cloud computing has low administration costs since no investment is required at the initial stages. Cloud computing is thus very suitable for projects which are short term. This is due to the fact that there is no need to set up the whole infrastructure, and users can work directly on the project (Yang, 2012), and the ease of integrations and fast deployment help in achieving this. Furthermore, cloud computing also provides maximum security to customers where they can use the resources from any region at any time.

With every type of business being operated in the cloud sets of different size companies are using cloud-based services. Enterprise businesses have hugely profited from cloud computing, from data storage, emails, web applications to ERP systems and offsite IT management. For any business entity, the importance of productivity is cost savings when it comes to implementing a new IT service. Cloud-based software could be used at any time on almost any kind of device with an Internet connection within an organisation, a benefit that drives to excellent collaboration, especially for businesses with remote workers.

Applying the cloud computing technology can cut costs of ownership of IT infrastructure significantly.

Because each cloud user is unique, the potential savings produced by using cloud computing services will differ. Many factors influence the total cost of ownership of operating IT infrastructure such as:

Reduced Upfront Expenses: Reducing the upfront costs, like building up a new datacenter from scratch and buying new equipment, such as (Servers, Firewalls, Routers, Switches, Data Storages, etc.) will help the business leaders to concentrate on the core business and save the money for real business opportunities.

Usage-based Pricing: sometimes companies need to conduct some software test, development, data analytics, and other time-limited processing, therefore, they just need to pay for limited servicers for some fixed time.

For example, a cloud computing end-user may require using five servers to develop and test an software over the course of a few weeks. Rather than having to buy the hardware and allocating and power to start the temporary task, you can simply use five cloud-based servers remotely.

Automation: cloud service providers handle the whole operation of hosting, maintaining, backing up data, restoring, monitoring, and providing technical support.

Reduced Downtime: with cloud computing technology and having a control to manage the services based on demand of users, the ability of having the systems up and running is much possible.

Virtualisation: applying virtualisation technology produces multiple virtual machines on a single physical machine which can lead to decrease the hardware and power expenses.

2.2.7 Disadvantages of Cloud Computing

Despite the many advantages, there are also disadvantages. There is no doubt that there is much evidence in favour of cloud computing, but there may still be problems such as server downtime, performance issues and IT maturity (Yang, 2012). Cloud computing services and internet bandwidth are closely related, where in order to perform and provide an efficient service, it is very important to have fast and consistent speeds since cloud computing uses the internet as its medium of data transfer. The UK Growth and Infrastructure Bill promises efficient, fast broadband networks across 90% of the UK by 2015 (Gov, UK, 2013). There is, nevertheless, a danger posed by allowing one's digital data to be held by third parties. There have been reported incidents of data theft and loss of data. With the widespread of social network and Web 2.0, organisations, the use of cloud computing is also increasing. Moreover, many fears and concerns about the data ownership is also. Regardless of the approach used, it should be kept in mind that since the applications are run by third parties, the users have very limited ownership and control over the software and hardware (Tsagklis, 2013).

Another major disadvantage of cloud computing is its reliance on the cloud service provider (Tsagklis, 2013). It is quite hard to shift to another service provider. Wishing to do so will lead to extremely tiring and difficult transfer of data volumes from one to the other. Therefore, the users should carefully vet their vendors before making any decisions (Tsagklis 2013). Table 2.1 shows some of the advantages and disadvantages of cloud computing.

Cloud computing has some technical disadvantages such as: demanding a continuous internet connection and constant speed, unsatisfactory features, security might not meet the organisation standards, danger of losing data (Miller, 2008, Jeffrey and Neidecker- Lutz, 2009).

Other serious technical disadvantages of cloud computing is downtime. It is possible to find a cloud computing service provider, even the truly best, would claim protection to service interruptions. Cloud computing systems are Internet-based, which means your access is completely reliant on your Internet and like any other things, services could be failed (Seshachala, 2015).

Vulnerability to attack is consider to be also a technical disadvantage of cloud computing. In cloud computing technology world, each component is possibly accessible from the Internet. Therefore, there is nothing connected to the Internet would be totally secure and might be attacked. As the concept of cloud computing is formed as an accessed publicly service so, there is no guarantee of keeping it secure.

In addition, limited control is in some cases, cloud users have limited control over managing and executing hosted services. This might be one of the technical disadvantage of cloud computing.

Cloud computing, particularly on a small business scale, can be expensive. The selection of which cloud service would meet your business needs will avoid paying extra money. There are some cost calculators available to expect the prices such as Amazon's AWS and Google's GCP.

Table 2.1: Advantages and Disadvantages of Cloud Computing

Cloud Computing Advantages	Cloud Computing Disadvantages
Location-independent	Dependency
Virtualized and dynamic	Confidentiality
Pay-as-you-use	Security of data
High-level computing	
24/7 support	
Scalability	
Sustainability	
Low total cost	
Utility-based	
Time-sharing models	
Secure storage and management	
Simplicity	
Flexibility of evolution	

2.2.8 Issues about the Adoption of Cloud Computing

There may be various issues to the adoption of cloud computing. There are can be problems relating to different aspects such as environmental, technical and organisational issues (McKinsey & Co., 2009). Some of the issues about the adoption of cloud computing is as follows:

2.2.8.1 Cost

The relationship between output and monetary input is referred to as cost effectiveness. A significant benefit related to the cost issue is the possibility of paying on the basis of usage rather than on any fixed costs (Armbrust et al., 2009). Furthermore, the need for less space and reduced staff and maintenance cost are further advantages since applications can be outsourced to the provider. Cloud computing can supply a vast scale commodity resource at very low cost, which is an essential capability. According to (Armbrust et al., 2009), reduced costs are gained due to a number of factors, which include electricity, hardware and software, network expenses and the network itself. The cloud provider, on the other hand, can evaluate the returns accordingly (Armbrust et al., 2009). Computation involving large amounts of data has become easier and wider with cloud computing, saving both money and time for user organisations. Parallel calculations are therefore faster in cloud computing as compared to private systems of computing. This means that there is a huge difference in time consumption. For example, a job completed using through cloud computing might take minutes or hours, while if a desktop system was used, it could take days or years. Therefore, calculations that used to be impractical are now easily manageable in just a few minutes, with data transfer being faster and quicker than ever.

There is an argument made by some studies regarding the hidden costs causing the users and client's economic burden, as they pay more than they expect (Benlian and Hess, 2011). Therefore, the fear of further rising of cost exists (Dwivedi and Mustafee, 2010). This is a possible reason of the reluctance to adopt cloud computing. Investment made according to the cloud services is also seen as a barrier by Saya et al. (2010).

2.2.8.2 Reliability

The technology is reliable when it can be dependable. The reliability can be measured by experiencing a very less downtime. Cloud reliability can be affected by many factors such as software malware, bugs, and technical limitations (Sedayao, 2008). Therefore, software reliability is crucial issue for cloud computing. Cloud computing acts as a safeguard and reliable source when there exist certain risks with the processing of a job.

2.2.8.3 Security Concerns

Security effectiveness refers to the work done on a large scale with less risks association. There are several security issues as stated by Thurman (2008). They include shuffling data, virtualization, data integrity and control and that concerning to remote areas. Thurman considers the computer risks to be quite high due to the gap that exists in the R&D. It is important to train people and use human service rather than solely depending on the technology (Cloud Security Alliance, 2009; umann, 2008).

The multi-core system and its processing cores are useful for the separation of data and privacy (Hewitt, 2008). This security is responsible for the protection of information being accessed by unauthorized means and parties. This is required mainly when the data and the information are over the Internet being passed between the provider and the user. It is, however, not a simple task to provide this security. The cloud provider alone cannot maintain the security. The provider is also required to keep protection for the carelessness made by the users and the employees. A safe approach for login is needed when the remote logins are being used (Cloud Security Alliance, 2009).

For the security of information, it is important to adopt prevention and security methods. To prevent undesirable outcomes, convincing people who adopt a certain attitude is important. In the aspect of system security, users are to be convinced to adopt required protection and avoid carelessness. The restrictions should include sharing of information for accounts or publishing it. Reluctance toward adopting cloud computing can result from the security issues like data and information theft and loss by cloud vendor or other insiders (Benlian et al. 2011; Hay et al.2011; Saya et al.2010).

A survey by Zhou et al. was conducted regarding the privacy and security issues. Individual discussions were made on security and privacy issues. The former was examined with respect to the genuine nature, its confidentiality and availability, audit characteristics and control; the latter was examined through the listing of out of date acts of privacy. Multi-location issues were also studied.

A further survey was made by Ahuja and Komathukattil (Ahuja, 2012). It discussed the general risks and issues concerned to clouds. It also discussed the steps that can be taken to deal with the risks and security issues.

2.2.8.4 Privacy Risk

Privacy is a significant barrier that prevents organisations from moving data to Cloud. According to Cloud researcher's service, there are three major sources of concern. There are security holes that may hinder and manipulate the data. Secondly, critical information and personal data can easily be studied and used without the user's knowledge or even against his will. Thirdly, not meeting certain laws is an issue such as localization of cross border data (Benlian and Hess, 2011; Marston et al., 2011b; Sarkar and Young, 2011). It also includes control over data, development and system as well as IT controls (Koehler et al., 2010; Zainuddin and Gonzalez, 2011).

2.2.8.5 Availability

The concern regarding the availability of computing services causes some organisations to feel reluctant toward cloud computing. Failure downtime is another concern as it does not have a fixed time but differs from provider to provider and can occur at maintenance levels and random unexpected moments too. There are reviews of some users stating that it not a reliable service (Koehler et al., 2010; Marston et al., 20110b). Furthermore, they do not hope for any improvements rather expect failures of availability in the future (Benlian et al., 2011; Russell et al., 2010).

Because of being a focus of the press, the providers of cloud service put in efforts to monitor and manage their services and they predict the future possibilities (Hikey, 2011). It is believed that the demand will rise from the development of analytics techniques by the service providers and researchers to meet the changes in the demand. This will help them operate in the service labels (Espadas et al., 2011).

2.2.8.6 The Organisations Size

According to certain studies, there is a negative effect of the size of an organisation of cloud service since large companies usually have quite a high structural inertia (Benlian, 2009).

2.2.8.7 Trust

Due to the unfavourable reputation and absence of trust in the technology provider (Hoehler et al.2010) Gar-rison et al. (2012), it is very important that a strong reliable relationship is developed between service provider of Cloud and its customers. Similarly, Walterbusch and Teuteberg (2012) also highlight the significance of a trustworthy relationship between the service provider and the customers as a requirement when adopting Cloud Computing. Hence, it is recommended to bridge the gap of information that exists between the two subjects.

2.2.8.8 Regulatory Concerns

All users shared reputation of the dame cloud (Armbrust et al.2010), and the issues of accountability that are based on general external policies, set standards and relating rules (Armbrust et al.2010; Ward and Sipior 2010).

2.2.9 Cloud Computing Deployment Models for Government

The following four scenarios are commonly used for the cloud computing by the government:

Government Public Cloud: A public cloud can be defined as cloud computing that is designed to meet the needs of the vendors and it is hosted in vendor datacentres. This is one of the easiest ways for the government to adopt cloud computing; however, due to privacy and security issues, it is an option that many will not wish to choose (Nelson, 2009). Some workloads do not involve classified data but only need computing applications to perform some computing tasks. The public vendor's value proposition is almost same to the value of the government public cloud. However, with a government public cloud, the cost of ownership is reduced since there is no need for IT infrastructure. Furthermore, better speed economical ways of service expansion is provided by it.

Dedicated Government Private Cloud: The Datacentre has to be situated within the country for reasons of privacy and security. However, there exists the possibility of using a public cloud and its cloud computing offers customized to customer needs, which shares the same properties as the government private cloud. However, this is not a commonly used option due to the high costs of setting up customer-dedicated cloud computing.

Self-Hosted Government Private Cloud: While a government data centre can be hosted strictly by a government entity, the labour union of the public sector does not allow a government datacentre hosting. It does not favour outsourcing due to reasons like data application integration. Hence, the GPC self-hosted allows governments to manage data centres of their own where they can run and facilitate cloud services through their personalized services.

The GPC offer of self-hosting is quite optimum for the government services and reduction of cost data centre. The same or even better security level and control over data can be achieved together with the benefits of Cloud Computing. Government's venture and investment in the licenses and the infrastructure is protected through the offer. This can be said as a further step toward the crucial entities of the government.

Government Private Cloud Hosted: Private Cloud is required to be hosted in-country as required by the security conditions. It cannot be hosted in another country as the international bandwidth does not suffice the process. However, there exists the possibility of hosting Private Cloud in the same country but at 3rd party. The complex nature of this computing allows such an option. The security and its complex nature are one of the few barriers that are there to move applications and services in Cloud Computing (Rosenberg, 2009) Accommodation of these services is important for any Cloud computing application. Since Cloud Computing resources are mostly in premise in nature, it concerns the government and other customers regarding its security and regulatory issues (Sideridis, 2009). The Private Cloud is required to be hosted in-country due to security and privacy reasons. However, there is the possibility of hosting it at third parties from the same country.

2.3 The State of Cloud Computing in Government

Progress in cloud computation technologies leads many to wonder, "If it works for business, why not for government?" (Condon, 2009a). Most firms providing cloud computing solutions to industry are publicly listed firms, and it certainly makes good business sense for governments to take advantage of this technology in the coming years. However, before proceeding further with this, it must be kept in mind that cloud computing is not without its fair share of challenges. To be realistic, a timeframe of around a decade or two could be reasonably required for the technology to gradually evolve, considering the breadth, scale and diversity of government applications which would be required to be addressed when adopting such technologies. Fundamental differences in public and private applications of cloud computing would have to be dealt with before such an initiative could practically materialize.

As has been repeatedly demonstrated, there is no one-solution-fits-all approach when dealing with government applications of such vast scale. Indeed, considering the diversity and multitude of government functions, a host of cloud computing solutions could be recommended for government applications – each with its share of limitations and challenges in terms of application and performance.

2.3.1 The State of Cloud Computing in the UK Government

The British government has taken a realistic and rational approach in taking the necessary measures towards initiating the process of incorporating cloud computing processes in its operations so that ultimately all government functions would be interlinked (Bryan, 2009). Hence, the G-cloud initiative entails ultimately interlinking all aspects of governmental functions, including the procurement processes of the various departments. Pursuant to the standards set by the Kasumigaseki Cloud, the British government plans to gradually implement a standardized cloud computing paradigm across all levels of the government, while also ensuring that the corresponding operating and maintenance costs for the system are maintained at a reasonable level.

Thus, the UK government has prioritized the creation of the "G-cloud", which is intended to demonstrate the importance associated with this initiative (Glick, 2009). The government also commissioned the Department for Business Innovation &

Skills and the Department for Culture, Media and Sport to collaborate towards issuing the Digital Britain Report in June 2009, so that official policy in this regard is publicly presented to all stakeholders, with Prime Minister Gordon Brown officially stating that "The Digital Britain initiative is an extension of our attempt to empower the coming generations with a robust economy" (UK Government, 2009). Interdepartmental information and technology avenues of the multitudes of government departments have to be made efficient and workable for the success of the Digital Britain strategy, and the efficient procurement of the relevant and corresponding associated hardware and software is an aspect requiring special focus. Providing guidelines on cloud computing for the government, the report explains that "the government of the day has been endowed and bestowed with the powers to set and decide on the course of the future events, by determining on the path any particular industry will be taking in the coming decades by utilizing the resources at its disposal. This is particularly true for sectors of the economy related to education, health and defence". The public is welcome to provide their input and feedback to the report and the corresponding framework by accessing the http://digitalbritainforum.org.uk.

Studies and evaluations of the existing market indicate an increasing awareness of cloud computing, and an understanding of the benefits associated with the adoption of this technology across the corporate world in both the United States and the United Kingdom. In a British survey of around 300 firms, around 53% of those polled acknowledged that they are utilizing some form of cloud-based computing in their daily operations (Cloud Industry Forum, 2012). A second study of some 900 firms by the Aberdeen Group (2012) revealed the prevalence of cloud computing, where "71% of the companies from the UK plan to invest in cloud, compared with 58% worldwide and 57% in the US". The inherent benefits and attraction of cloud computing cannot be ignored at any level, as displayed by the British government's initiative to reduce its annual £15 billion information technology budget by gradually incorporating cloud computing features in its operations. Such initiatives have led to concerns about staff layoffs, but this has been unfounded. Instead, as businesses gear up to implement cloud computing strategies, they have a greater need of the skilled manpower required to implement the initiatives.

Indeed, the incorporation of cloud computing in local businesses is set to explode in the coming decades, with the global market for this technology expected to be around US$270 billion by 2020. The United States would have the largest share of the market, followed by the EMEA, including the United Kingdom (Market Research Media, 2012). As per current and recent info-communication development authority (IDC) estimates, the UK cloud computing market alone was expected to be valued at around £20bn by 2020, while by the close of 2014 it would already be worth around £6bn (M7, 2013).

Investing in cloud computing methodologies makes good business sense for companies, since they only have to invest in the resources during the returns automatically flow in (Alshamaila, 2013). This in turn offers very good profits to be accrued on the investments made, enabling organisations to concentrate on their actual, core operations and to satisfy clients by improving their level of services in their basic areas of service.

2.3.2 The State of Cloud Computing in Other Countries

Realizing the potential benefits and cost savings associated with the adoption of cloud computing initiatives, governments around the world are scrambling to incorporate the technology into their operations. The United States government is at the forefront of this effort, as demonstrated by the federal CIO's consideration of cloud computing initiatives to have strategic value for the country. Testifying before the House Committee on Oversight and Government Reform, the CIO contended that "The current President is definitely on track in its initiative to ensure that the benefits of cloud computing are made available to all sectors of the American population, so that everyone benefits" (Kundra, 2010.

Cloud computing technologies have already been used for quite a while by employees at numerous federal agencies and their associated offices (Mark, 2008). However, by habit and default, the government has been averse to allowing their employees to utilize such technologies so openly and frequently, especially in the execution of official duties and responsibilities. The security risks of hacking and eavesdropping in accessing such public domains have always been a debilitating factor hindering the widespread acceptance and mobility of such applications across the various levels of government operations. Consequently, in view of the perceived risks, the government initially tried its best to discourage and hinder the widespread use of cloud computing facilities. However, policy makers soon realized the inherent benefits of utilizing such programs and the fact that the benefits far outweighed the few risks associated with the applications motivated the agencies concerned to change tack (Wyld, 2009). To facilitate and modify the process, the General Services Administration Office (GSA) sent a report to the President's office outlining the processes, ways and means to promote the safe and secure utilization of such facilities in government departments. The GSA subsequently recommended for President Obama should utilise social media as an initial step towards the further widespread use of cloud computing features across all levels of government operations as the pace and awareness of cloud computing processes increased amongst the target population. Then, as its usage became more widespread, the cost of implementation too would correspondingly decline (Goodwin, 2008).

Pursuant to the policy changes enacted by the GSA, the federal CIO is taking all possible measures to initiate the transition to and adoption of the most beneficial cloud computing solutions for all levels of the government (Kundra, 2010). It is indeed heartening to note that these measures have the full and complete backing and support of the Obama Administration at all levels (Obama, 2009). The global financial crisis broke soon after President Obama started his first term in office, and he consulted with the CIO on all possible means to reduce the maximum possible operating costs of the government machinery. One aspect duly highlighted and impressed upon him was the adoption of cloud computing procedures and processes, and this advice was accepted. The adoption of such processes has, for example, seen the costs of web portal maintenance drop by over 50%.

At present, the cloud computing initiatives of the federal government have been implemented across multiple government agencies and bodies in those spheres of information exchange and communication, which constitute the SaaS layer. The vast majority of federal agencies have arranged for their web portals to be linked to their social networking web sites, including the likes of Facebook and Twitter. The creation of a mature social presence on the internet is in alignment with the President's endeavour to create a socially connected government which can be in touch with the aspirations and concerns of the electorate (Obama, 2009). However, while such measures are indeed commendable, they are leaving significant gaps in making optimum utility of the range of benefits accruable from cloud computing.

The CIO's offices have been zealously working on promoting cloud computation techniques for the benefit of both the various government agencies and the general public. In addition, other government oranisations and offices are now gradually taking the lead to promote cloud computation technologies in their respective departments. In this regard, the initiatives undertaken by both the US Agency for International Development (USAID) and the National Institute of Standards and Technology (NIST) have followed the current prevailing trends by adding links to their activities on such social and networking sites as YouTube and Facebook, hosting their portals on a cloud and adding relevant links to their social presence from their official portals. The validity of the President's efforts is further endorsed by the fact that the executive branches of the state, including the US House of Representatives and the Senate, have also followed suit by uploading videos of their sessions to YouTube.

Of the multitudes of government departments coordinating their business processes through maximizing the utilization of cloud computing processes, the Department of Defence is considered a pioneer in taking the initiative towards implementing this technology in its day-to-day functions, embarking on the process from 2006 onwards when they teamed up with multiple vendors, including HP and SUN, for SaaS processes, including data storage (Mrk, 2008). Within three years, they had streamlined their business processes, making it a purely transactional and automated process. Hence, end-users simply log in with their particulars through specific interfaces at designated portals, and the process goes through laid-down procedures of requiring the necessary approvals and comments, storing all data on predetermined servers utilizing cloud computing technology.

Another department worth mentioning which has whole heartedly embraced cloud computing technologies in their day-to-day functioning is the recruitment process of the United States Armed forces. In keeping with the trends accepted by the current generation of youngsters who form the bulk of fresh entrants, military recruiters are increasingly making use of a social presence and associated portals in trying to reach out to the widest possible audiences in their endeavours to recruit manpower into their ranks. To a great extent, the credit for having the vision and foresight to initiate this dimension in the recruitment process would go to Major General Thomas Bostick, head of the Army's recruitment command, who is of the opinion that the military "is making the effort to access the greatest possible sections of the American public so that they are aware of their military's functions and benefits." (Reisinger, 2009).

As the head of the National Institute of Standards and Technology's cloud computing research team, Peter Mell has summed up the general sentiment concerning the government's dithering on the adoption of cloud computing technologies by stating that, "cloud computing is of great interest to the U.S. government, and it's seen as a great opportunity to promote efficiencies, but there is not widespread adoption. At all levels of the government, at least in IT, there is intense scrutiny of the new paradigm and evaluation of its utility" (quoted in Chabrow, 2009). However, partial adoption of cloud computing techniques has been observed in multiple sectors of the government.

Besides the United States, the benefits of cloud computing are also realised in the European region. Oleg Petrov, working with the World Bank's Government Transformation Initiative, has recently undertaken a study of the current state of affairs of the adoption of cloud computing by European governments. It has been observed that the main thrust of the initiative is currently being undertaken by Sweden, France and Spain (Petrov, 2009). The governments of these countries are working on incorporating cloud computing in multiple sectors of their economies and public institutions as listed below, as well as working on internal, private cloud environments:

- Modalities towards managing public sector housing.
- Processes of managing transportation networks.
- Charting economic development.
- Managing health services.
- The contracting of various public services.
- Overseeing education services.

The National IT and Telecom Agency in Denmark has recently completed a pilot project to coordinate the cloud hosting of the services of its Digital isér.dk and NemHandel units, as a replacement for the traditional in-house methodology and model.

Initial studies and results indicate that the initiative is a significant success (Government of Denmark, 2009). The National IT and Telecom Agency has also teamed up with Local Government Denmark (LGDK), which represents all 98 Danish municipalities, in another initiative to explore the options of employing cloud computing technologies in the nationwide IT infrastructure (ePactice Team, 2009).

Considering the close cooperation between all EU member states on a host of issues which are a common challenge to them, it is very reasonable to expect that in the scope of the agreement the countries will very likely pool their resources towards a unified strategy for adopting cloud computing methodologies and infrastructure (Dimaio, 2009). Similar to the United States, the underlying challenges and problems in all of the member states of the EU would see these countries adopting the same strategies in this respect as the US, cooperating on a transnational level.

Considering the aforementioned, it is now reasonable to assume that the adoption of cloud computing techniques is not just limited to the United States and United Kingdom alone. Instead, the entire EU is working on a unified strategy to make the most of the benefits associated with this technology (Dimaio, 2009). Other developed countries, including Japan and Singapore, are making in-roads in this respect.

The Japanese government has initiated the Kasumigaseki Cloud initiative, named after the business district in the city where the bulk of government offices are located (Hicks, 2009), with the intention that a single private cloud would host the infrastructure for all the associated government offices (Ng, 2009). Such a structure is intended by the Japanese Ministry of Internal Affairs and Communications (MIC) to provide for the rationalization of all systems across all levels of government functions (Government of Japan, 2009), besides making it easy to maintain and cater to clients. Such a strategy is intended to provide the dual benefits of the easy maintenance of the system, and also a "green" IT infrastructure (Roseberg, 2009) whereby the Kasumigaseki Cloud, part of the 100 trillion Yen Digital Japan Creation Project, would create thousands of new IT jobs to revitalize the economy, and double the domestic IT market by 2020 (Hoover, 2009). The Ministry of Internal Affairs and Communications (MIC) is of the opinion that "making greater use of ICT domestically would necessitate the relevant authorities to take the lead and the initiative" and it would also be an initiative to reduce the digital divide in society (Government of Japan, 2009).

The info-communication development authority (IDA) in Singapore attaches significant importance to cloud computing, realistically recognising it to be the future of IT and communications networks in the future (Hicks, 2009). The IDA's research-based Open Cirrus cloud project has partnered with prominent and international firms of global repute, including HP and Yahoo, to implement this initiative and progress the IT network in the island nation.

While the Chinese government has yet to undertake a national cloud computing initiative, local and regional governments are all too aware of the benefits offered by the process, and are forging ahead with IBM in developing cloud computing infrastructure for their areas. The regional government in Dongying, in the north of the country, is developing a cloud computing solution towards implementing its e-government initiative through the Yellow River Delta Cloud Computing Centre, and Mr. Li Jinkun, the vice-mayor of the city has labelled the effort as a drive to "become a 'city of digital innovation'". Similarly, Wuxi in South Eastern China has set up a government-funded 'cloud services factory' where all small start-up companies in the area can access the services offered by this initiative allowing access to state-of-the art IT infrastructure at very affordable costs. Considering the funding constraints inevitable with new businesses, this initiative is intended to provide indirect funding to businesses by helping ease up funds for other activities, while the IT infrastructure is handled by the local government (IBM, 2009).

The government information technology service (GITS) in Thailand is in the process of setting up a cloud for government services which would offer SaaS services, having already established a centralised platform for web-based e-mail services. Such rationalisation will help in increasing service levels for the population, besides cutting down considerably on the associated costs (Hicks, 2009).

The Ministry of Commerce in New Zealand is setting up studies on how cloud computing and SaaS can benefit and streamline the functioning of the government while simultaneously revamping its IT procurement processes. The "centres of expertise" effort in this regard is intended to benefit all stakeholders (Strecker, 2009).

The Vietnamese government has teamed up with IBM to explore and create cloud computing solutions for its government and education sectors while it moves to rapid industrialisation (Nystedt, 2009). Willy Chiu from the IBM Cloud Labs in the country is of the opinion that “the government is of the perception that it could utilize cloud computing interfaces to boost and revive the services sector” (Babcock, 2010).

2.3.3 The State of Cloud Computing in the Saudi Government

In Saudi Arabia, cloud computing efforts are being initiated by two publicly-traded, government-owned and -operated telecommunications companies. Starting 2010, these firms have taken the initiative to explore how they could offer their services in this way to the corporate and financial sectors in the country.

A primary concern in the Saudi corporate sector is the availability of a low-cost data recovery mechanism to ensure that businesses do not needlessly suffer in the case of breakdowns in existing processes. Accordingly, the telecoms companies are working to fill this void at the moment (Research and Markets Adds Report, 2010). However, overall there is no observable initiative to implement any cloud computing solutions in the government sector, which may be partly due to the overly bureaucratic structure of the multiple layers and sectors of the existing government machinery. Experts are of the opinion that perhaps a major push and initiative from a member of the royal family or someone in a position of authority is a prerequisite before the Saudi government would take the necessary and required steps to explore the inherent benefits offered by cloud computing solutions to stakeholders (Research and Markets Adds Report, 2010).

A global market advisory firm, the International Data Corporation (IDC), is of the opinion that the traditional mindset of the Saudis, emphasizing security concerns in allowing external businesses to handle a firm’s processes, could be a major factor hindering the growth of cloud computing technologies, since this would involve a major outsourcing exercise involving external business partners offering managed services. However, progress is being made, and current statistics indicates that outsourcing investment increased by 16.3% during 2014 while the corresponding IT services market overall expanded at a lesser rate of 13.9%. The IDC also offers the insight that investment and expenditure in cloud computing services would exhibit a healthy 52.9% surge even if current levels of investment are very low.

In line with global business trends, and in order to be competitive in the global marketplace, Saudi organisations have to be responsive to the current need to be more agile, increase workplace efficiency and standardize IT functions. Correspondingly, making inroads in these aspects requires businesses to embrace the concepts and initiatives of virtualization, cloud computing, and analytics. Realising the current gap, Saudi businesses are gradually responding to market-driven needs and are now mentally prepared for the inevitable outsourcing of their IT functions while they focus on their core business areas. The increasing complexity of IT systems and a shortage of corresponding manpower to manage those systems is also a driving force in motivating businesses to explore cloud computing options.

Considering the potential inherent in cloud computing and the realization among Saudi Arabian companies of the need to use this technology, the telecoms providers making ground-breaking efforts to provide the technology are devoting significant investments to developing a range of options for their clients. According to Saudi work ethics it is preferred that Saudi companies associate more with other companies who have a local presence and therefore in the spirit of indigenization, foreign firms interested in having a share of the market are collaborating with local partners to develop local solutions. Such local presentations have been made for a range of offerings, including business development, consulting, training clients and educating them in cloud computing.

The international data corporation (IDC) has observed that, while they are obsessed with security in the fast-moving Middle East, Saudi companies are reluctant to make the transition to fully operational cloud computing interfaces, and they are also slow to try to customise their requirements in private networks. However, as awareness builds and companies are made increasingly aware of the benefits and security inherent in even the most public of cloud computing interfaces, companies are expected to sign up for the experience and thereby partake of the “true” cloud computing experience which would definitely include aspects of automation, metering, chargeback and other features.

CEOs at almost all major Saudi corporate entities are increasingly weighing the options on how to harvest the inherent benefits of cloud computing, given their requirements for commercial success and managing business risks and also to bring down operating costs to manageable levels. Hence, while there is certainly tremendous positive pressure on businesses to join in with the experience of cloud computing, there are also significant concerns among companies regarding how service providers would address issues related to data security, usability and privacy and ensuring stable connectivity. To complicate matters, a perennial shortage of qualified staff able to handle the demanding parameters of cloud computing environments is also a challenge which has to be handled appropriately. Hence, to quote Naqshbandi, "cloud computing would be of much assistance to clients who have constraints in managing expenditures vis-à-vis the data management aspects of their systems, since otherwise private management of SaaS networks or databases will require the hiring of qualified staff to manage the same.

2.4 Major Challenges Facing Government in Implementing Cloud Computing

Implementing new technology and processes inevitably entail a measure of risk for all stakeholders, since it can never be accurately forecast how the new technology would affect the end results. But, similar to the situation in other technical fields, new technology implemented in the information technology sector has to undergo a process of testing, analysis and evaluation to try to ensure that the result is positive. While theories of cloud computing have been around for some time now, the risks lie in how the processes are implemented in each new environment where it is tried out, the compatibility of government policies towards the initiative, and the inevitable possibility of data leakages occurring during the implementation and testing phase of the enterprise.

The need for an industry-wide and enforceable code of standards for cloud computing initiatives is required so that individual clients contracting to implement private cloud networks are assured of a level of service as per industry standards, and government oversight then becomes easier too.

Concerns about data security could be described as one of the biggest challenges and impediments to the unrestricted global acceptance of cloud computing solutions.

While small organisations which are limited in scope would perhaps not be so concerned about who inadvertently gets to see their internal data, the same cannot be said for large corporations. They would zealously spend billions to ensure the safeguarding of their data and texts from all kinds of prying eyes, and will also take all necessary steps to avoid inadvertent slips in their in-house information systems (Paul Hofmann & Woods, 2010). Hence, if cloud computing systems too could provide the same levels of data security as is normally prevalent within organisational systems themselves, there is every reason to believe that cloud computing would definitely receive a serious boost in its acceptability across all levels of the business and corporate world, and also at government level too (David, 2012).

There is a serious need to work on removing the perception that sensitive data and information stored in cloud computing servers is often susceptible to hackers and unauthorised access. While many measures could be taken prevent this, foremost amongst these could be that all access requests to databases should be logged. Only authorised and genuine requests should be processed, while unauthorised attempts should be tagged and analysed to try to ensure that there are no concerted efforts to breach the firewalls installed around the data. Also, remote users of data need to be documented and provided with access to their data in a timely manner at all times so that issues of accessibility do not arise. Checks taken should be made and measures to ensure that data is not leaked during transmission between the user and the database, while continuous and round-the-clock monitoring should be initiated to ensure that viruses and worms are not allowed to enter the networks at any time. Available records indicate that in this respect major cloud computing systems have been susceptible to catastrophic failures, which certainly shakes the confidence of investors. The fact that Google was offline for up to 100 minutes in September 2009 certainly shook consumer confidence in cloud computation systems (Gralla, 2009).

The performance of cloud computing networks may also be dependent on the number of users logged into the network at any single time. It has been observed that, given a greater the number of users accessing a database, the associated performance and data extraction rates also have a tendency to degrade gradually. This could go on to the extent that the system is eventually overwhelmed by the number of users, at which point the cloud network would have a tendency to crash, and the entire system would probably have to reboot. Hence, it is very important to take all possible measures so that the number of users expected to access the system is correctly judged, ensuring that data is available continuously and consistently.

2.5 Analysis of Relevant Studies

Articles in the literature on cloud computing have analysed and various aspects of the subject from a diverse range of angles and perspectives. This study is mainly concerned with the organisational aspect of cloud computing and looks into the issue of how firms would perceive the transition from a traditional approach to a cloud computing environment. Janssen and Joha (2011) attempted to determine precisely why the public sector is so hesitant in moving to cloud computing, despite the obvious potential benefits of such a step. Their analysis listed the advantages and disadvantages of such a transition, which included organisational, political, technical and economic issues. Both Winkler et al. (2011), and Sarkar and Young (2011) made similar observations, and the latter documented the process of an Australian higher education institution transitioning to a cloud computing environment over a 3 year period. Benefits in terms of cost and the ability to increase collaboration amongst researchers and their peers were determined to be primary motivators for the exercise. However, concerns over data security were the most negative factor in the minds of the decision makers and IT personnel overseeing the transition. Sarkar and Young (2011) summarised their findings based on aspects of resource utilization, and the political power in play in the location, while Xin and Levina (2008) managed to add in elements of intellectual property aspects too towards the development of the functional SaaS model. Kaisler et al. (2012) also conducted on extensive study of the determining factors which led information technology teams to decide to move to cloud computation interfaces.

Koehler et al.'s (2010) study to design ideal SaaS pricing parameters considered how six aspects of cloud computing are influenced by such diverse factors as the demographics of the location of the client. Along the same lines, a study of three European companies has also analysed how the cost factor prompted the adoption of the SaaS process (Benlian 2009; Benlian and Hess 2009), and further studies considered how resources were allocated and how the behaviour of the stakeholders affected the decisions made (Benlian et al. 2009). Issues and factors of the technical aspect have also been analysed in several studies to determine how important these factors were in making decisions to adopt cloud computing (Saya et al., 2010). Benlian et al. (2010, 2011) studied the period immediately after organisations had adopted cloud computation interfaces, with an emphasis on the quality of the service actually received against what was initially perceived, which would be a factor in determining whether or not the organisation would continue with cloud-based SaaS solutions.

A few studies have also focused on specific factors which would de-motivate organisations from adopting cloud computing.

Such specific factors which been analysed include aspects of internet jurisdiction aspects (Ward and Sipior 2010), challenges in outsourcing (Clemons and Chen 2011), internet security (Kim et al. 2011), overall physical and electronic security issues (Hay et al.2011), reliability and the availability of information (Russell et al. 2010), the configurability of data and the co-creation of value (Zainuddin and Gonzalez 2011), changes in energy consumption (Bose and Luo 2011), and the effects of how feedback is perceived (Koslowski and Stru¨ker 2011).

A few other studies have also concentrated on the purely commercial reasons for adopting cloud computational environments while also looking for the challenges of such initiatives. Armbrust et al. (2010) listed around ten demotivating factors, and a SWOT analysis of the cloud computation industry by Marston et al. (2011a, b) contains additional factors. Iyer and Henderson (2012) conducted a research with all the main business stakeholders in determining how value is generated and how the net organisational value is capitalised with the adoption of cloud computational frameworks. Lamberth and Weisbecker (2010) provided a cost-benefit analysis of cloud computing while Martens and Teuteberg (2012) provided a correlation of the risks and benefits of an initiative. Finally, Benlian (2010) showed that CIOs favour SaaS implementation over the corresponding open-source enterprise application software.

2.5.1 Technological Drivers

A very common motivating factor towards adopting cloud computing is the low cost availability of high-end IT resources, which is a huge of benefit to small and medium enterprises (SMEs) (Benlian and Hess 2011; Janssen and Joha 2011; Zainuddin and

Gonzalez 2011). The ease of use and convenience of cloud-based software is also a major attraction for companies (Benlian et al. 2010; Winkler et al. 2011). The correlation and standardization of data presentation and formats (Armbrust et al. 2010; Koehler et al. 2010) along with the cloud's capacity to easily accommodate both large and small volumes of data are further attractions (Benlian et al. 2011; Saya et al. 2010). Virtualization is a contributory factor for the elasticity in the system, and the excellent options to customise the database in a cloud computation interface is a very attractive feature for businesses (Benlian et al. 2011; Zainuddin and Gonzalez 2011).

While the ease of accessing cloud-based databases is a factor (Benlian et al. 2010; Saya et al. 2010), access to a more reliable IT network is also attractive (Benlian et al. 2011; Leimeister et al. 2010). The number of options in analysing the data is always greater with a cloud network than with private networks (Benlian et al. 2011), while the multiplier effect in the performance of the client's IT systems are all worth exploring (Marston et al. 2011b).

2.5.2 Organisational Drivers

The overall cost savings offered by cloud computing is perhaps the single largest motivating factor for businesses to adopt this system. While the management may have certain alternative solutions in mind (Ozdemir et al.2011), these would all be very much challenged by the inherent benefits observed in cloud computing compared to any other system (Benlian et al. 2009).

Studies have also indicated that, in addition to the benefits listed, cloud computing also entails the additional benefits of economies of scale (Leimeisteret al. 2010), which would motivate vendors to manage client databases at very nominal costs (Benlian and Hess 2011). Hence, the greater the numbers of users of a cloud, the higher the financial benefits accruable to the users (Steinfield et al., 2011a). Further, greater numbers of users lessens the associated risks in the system for the client (Koehler et al., 2010), who is free to pursue and build upon his core business practice more efficiently (Bose and Luo, 2011; Janssen and Joha, 2011).

The use of cloud computing avoids the need for the client to make huge investments in IT infrastructure (Koehler et al. 2010; Steinfield et al. 2011b), which enables organisations to have the required financial liquidity to adapt their systems in the event of changes in their business models. Also, the ease and convenience of customising cloud computation services is an attraction (Benlianet al.2011; Sarkar and Young, 2011). The green services that provided by the service provider can motivate to adopt computing (e.g., Bose and Luo 2011; Dwivedi and Mustafee, 2010; Sarkar and Young, 2011).

2.5.3 Environmental Drivers

With the widespread implementation of cloud computation, convenience in data sharing would foster organisational growth (Sarkar and Young, 2011), and increasing interaction between the client and the cloud service vendor would further improve the system (Zainuddin and Gonzalez, 2011).

Existing government regulations often significantly influence how conveniently a new technology is adopted in the market Tornatzky and Fleischer (1990), which can determine the success or failure of an initiative (Teo et al., 1997). Government directives on e-government initiatives will clearly have an impact on how new technologies are adopted in the public sector (Dawes and Pardo 2002; Harris, 2000). Studies have also indicate that after-installation support and the service levels offered by the vendor are factors affecting the acceptance of cloud computing technologies (Benlian et al., 2011), as further discussed by Kosloswki and Stru¨ker,2011).

2.6 Critique of Relevant Literature: Users' Acceptance of Cloud Computing in Saudi Arabia (Saad T. Alharbi)

Only a few studies have been undertaken in Saudi Arabia to investigate the adoption of cloud computing. The aim of a study by Saad T. Alharbi (2012), in Saudi Arabia was to investigate the effect of various factors such as gender, age, education, job domain, and nationality on the acceptance of cloud computing. The study used an online questionnaire as the primary tool to collect data. The theoretical background was based on the TAM model. The targeted participants were employees who worked for IT organisations in the public sector.

The analysis showed an overall high level of overall acceptance of cloud computing among users in Saudi organisations. Also, it was found that their attitudes towards adopting cloud computing in Saudi organisations were significantly affected by the technology's perceived usefulness and ease of use. Furthermore, behavioural intentions were found to be significantly affected by perceived usefulness and overall attitudes towards the adoption of cloud computing. Thus, increasing the awareness of users towards the usefulness and ease of use of cloud computing will be most likely to increase the acceptance of such technology in Saudi organisations. Also, the effect of factors, such as trust, privacy and cost on attitudes towards cloud computing is an important topic that should be considered further in the future.

This is one of the rare studies conducted in the Saudi context, and there is a clear need for further research in this country. Saad T. Alharbi (2012) used the TAM model as a theoretical basis to investigate the factors that affect the adoption of cloud computing from the perspective of users. However, this present thesis focuses on the adoption of the technology of the level of government organisations. Furthermore, Alharbi (2012) used only quantitative methods to collect data and this may not be sufficient to understand the actual problem and dig deep in the organisations in order to enrich the data and to determine the influence of technological, organisational, and environmental factors. More comprehensive studies are needed to fill the existing gaps in the literature.

2.7 Critical Review Findings

The discourse above bears testimony to the interest in the specifics of cloud computing, where multiple challenges remain for its adoption. While the theories are widely available, synchronising them with the practical aspects needs to be worked upon, and much research needs to be done in this regard before governments will formally start adopting the technology.

So, while many studies have been published which give details of various aspects of cloud computing, practical work which would unequivocally answer the questions regarding the extent to which governments can effectively adopt cloud computing is perhaps not as widely available. A host of associated issues also needs to be addressed, including a conceptual model of the cloud computing and the precise nature of the effect of various factors on the adoption of cloud computing.

The majority of studies undertaken to date are intended prove the potential benefits which could accrue to government departments in adopting cloud computing, although hardly any studies have demonstrated the impact of undertaking this initiative in non-governmental, or government organisations.

Another noticeable issue is just how much ground governments in developing countries such as Saudi Arabia need to cover before adopting cloud computing technologies. The majority of studies undertaken gather data from simple questionnaires and the like, but there is now an urgent need to undertake significant empirical studies observing the effects and the results of the adoption of cloud computing frameworks by public entities.

Most studies undertook concerning cloud computing tried to cover the technological factors only. However, this gives the mistaken impression that the challenges in cloud computing are restricted to the technical domain. Unfortunately, this is not so. Rather, the issues are a part of the broad spectrum of technological, organisational and environmental aspects. A few studies have broadened their scope to cover small and medium enterprises (SMEs), but overall there is room for many further studies in this respect.

Further, the prerequisites and basic bottom line requirements for an organisation wishing to adopt cloud computing are not clearly and expressly defined. In the absence of clearly laid down frameworks, government bodies are often unclear about the precise requirements which would enable them to benefit from this technology.

In Summary, the issues about the adoption of cloud computing are needed greater scrutiny from us. These issues need to be examined in the light of a comprehensive model that is developed based on the literature review findings. The existing gap that has been identified will be filled by conducting an empirical study in order to understand all aspects of the research problem in Saudi government sector. All this would help in motivating the Saudi government to adopt cloud computing.

Based on all the above discussion, the following action should be taken:

1. More empirical research needs to be undertaken in real-world public sector scenarios.
2. Cloud computing research needs to incorporate more variables and uncertainties in the studies undertaken so that the results can cover varied aspects such as technological, organisational, and environmental factors.

3. A clear framework needs to be defined on how cloud computing models would be implemented.
4. A greater understanding is needed of why government organisations in developing countries like Saudi Arabia are reluctant to adopt cloud computing.

Cloud computing research is still in its infancy, and much work remains to be done to resolve all the challenges observed in its implementation. The next chapter tries to establish a conceptual framework for understanding how to adopt cloud computing at the organisational level in government.

2.8 Chapter Summary

This chapter highlights the issues about the adoption of cloud computing technology. A small number of relevant studies were identified which dealt with the government organisation. The gap has been identified and showed that there was the absence of empirical and theoretical studies concerning the adoption of cloud computing in the government sector in the developing countries. Therefore, this chapter presented a complete background about all aspects of adoption the cloud computing and clarify any existing ambiguity surrounding the research problem. Also, the chapter reviewed the relevant previous studies in the literature in order to understand all the factors that could effect on the adoption of cloud computing. The chapter also summarises the existing literature on cloud computing and gives an overview of the applications of this technology in various governmental organisations. A summary of the most common reasons why government organisations do not adopt cloud computing technology is presented.

3 DEVELOPMENT OF CONCEPTUAL FRAMEWORK

This chapter analyses the relevant empirical studies and theoretical literature, ultimately leading towards a conceptual model of the adoption of cloud computing by government organisations (see figure 3.5). An understanding of the adoption of the cloud computing across the government sector can then be supported by the recommended conceptual framework. The three parts of this framework are based on Iacovou et al. and Technology-Organisation-Environment (TOE) model: technology and organisation readiness, environmental and external pressures, and perceived benefits.

Furthermore, the commonly used theories of the adoption of innovation are discussed in this chapter. Beside to the understanding the nature of cloud computing adoption cases that have been done in the government sector. The proposed conceptual model will subsequently be used as the basis for a general understanding of the adoption of cloud computing in Saudi context as well as the data collection and analysis conducted in this study.

3.1 Theories and Models of the Adoption of IS innovations

Theories of the adoption of information systems innovations are discussed below, focussing upon the frameworks that help in examining the facilitating and inhibiting factors involved in the process of adoption and organisational innovation caused by information technology. This type of IS model is not new and such models have been proposed since the 1940s, with the first example published by Ryan and Gross in 1943. It is highly supported by social science scholars, policy makers and industrial groups. Furthermore, the knowledge provided concerning the adoption and diffusion of IS innovations is based on the theoretical models in the fields of marketing, medicine, sociology, economics and psychology (Gatignon and Robertson, 1989).

Recently, the sphere to analyse the adoption of organisations in an international system of innovations has gained momentum (Tan et al., 2007). Theoretical frameworks are employed to study the factors influencing information systems at the organisation and individual levels. These theories have conducted an empirical analysis in the form of a number of quantitative and qualitative studies. These help in the identification of facts that ease or impede the international system of adopting and diffusing (Shalhoub and Al Qasimi, 2006; Zhu et al., 2006a; Thong, 1999). No one unified theory exists, and instead different frameworks help in explaining the diverse features of innovation (Downs and Mohr, 1976).

Research on information systems employs various theories (Wade 2009). This section emphasises only the technological theories of adoption. The technological acceptance model (TAM) is the most widely used theory of this type (Davis 1986, Davis 1989, Davis et al. 1989). Ajzen 1985, Ajzen 1991 believes that the theory of planned behaviour (TPB) is also an effective theory whereas the unified theory of the acceptance and use of technology is regarded by Rogers 1995 and Venkatesh et al. 2003 as an effective one too. Meanwhile Tornatzky and Fleischer 1990 regard TOE frameworks as the most efficient type of theory of the adoption of technology. Institutional theory, the TOE framework and the Diffusion of Innovation (DOI) are considered here because of their applicability at the firm level (see table 3.1), whereas the others mentioned above are considers as individual level theories.

3.1.1 Technology-Organisation-Environment (TOE) Framework

This framework was designed in 1990 by Tornatzky and Fleischer. It identifies the components of an enterprise which tend to influence the adoption and implementation of technological innovations, which are categorised as the technological, organisational, and environmental contexts (see figure 3.1), which explores the frameworks and theories that applied in previous studies. The first category refers to the technological issues that are involved in an organisation such as the IT infrastructure, software, hardware, and technical issues. The second refers to the internal and external pressures related with an organisation such as the market competition, regulations, and policies. Whereas the third describes an organisation as its scope, size and management structure (Thompson, 1967, Khandwalla, 1970 and Hage, 1980).

Table 3.1: Theoretical models and frameworks for examining factors affecting the adoption and diffusion of information systems (IS) innovations (Oliveira et al. 2011a)

Theory	Level	Previous Studies
Technology-organisation-environment (TOE) framework	Organisation	(Kuan and Chau 2001), (Zhu et al. 2003), Scupola (2003), Wu et al. (2003), (Teo et al. 2006), (Zhu et al. 2006b), (Zhu and Kraemer 2005), (Pan and Jang 2008), (Lin and Lin 2008), (Oliveira and Martins 2008), (Liu 2008), (Oliveira and Martins 2009), (Oliveira and Martins 2010a)
Theory of the diffusion of innovation (DOI)	Organisation	(Cooper and Zmud 1990), Agarwal and Prasad (1997), (Thong 1999), Armstrong and Yokum (2001), Beatty et al.(2001), (Eder and Igbaria 2001), (Beatty et al. 2001), (Bradford and Florin 2003), Bradford and Florin (2003), Mustonen-Ollila and Lyytinen (2003), (Zhu et al. 2006a), (Hsu et al. 2006), (Li 2008)
Institutional theory	Organisation	Abrahamson and Rosenkopf (1993), King et al. (1994), Scott (1995), Chatterjee et al.(2002) , Gibbs and Kraemer (2004)
Lacovou et al.'s (1995) Model	Organisation	(Hsu et al. 2006), (Oliveira and Matins 2010b)
Technology acceptance model (TAM)	Individual	Igbaria el al. (1997), Grandon and Pearson (2004)
Theory of planned behaviour (TPB)	Individual	Riemenschneider and McKinney (2001) ,Workman, M. (2005)

The TOE framwork is in fact an effective analytical framework. It helps in studying the processes of adopting and assimilating many innovations in information technology. It has a strengthened theoretical background and a persistent empirical adherence. It is potentially applicable to the domain of IS innovation. Admittedly, the factors notified under the above-mentioned contexts may tend to transform into a variety of researches. Rogers theory of diffusion of innovation (DOI) is related to this framework, and emphasise both individual and organisational characteristics (Rogers, 1995). Organisationally identified characteristics are both internal and external leading towards organisational innovation. Moreover, these tend to be related to the organisational and technological contexts of the framework. However, it also tends to have crucial features. The environmental context represents certain bars and available initiatives for innovation in technology. Rogers' DOI theory is said to more efficiently elucidate the intra-firm diffusion of innovation than the TOE framework (Hsu et al., 2006).

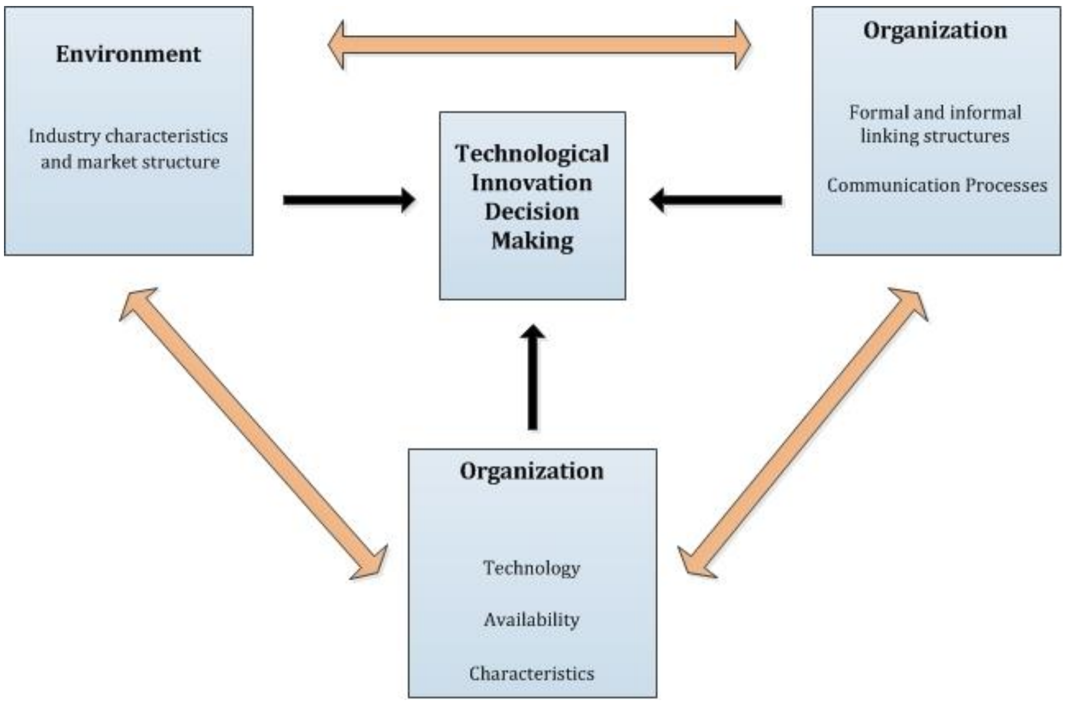


Figure 3.1: Technology-Organisation-Environment framework (Tornatzky and Fleischer 1990)

3.1.2 Theory of the Diffusion of Innovation (DOI)

Studies about the adoption of information technology innovations have been well documented in the literature. Rogers' (1983) innovation diffusion theory is useful for the study of the factors that facilitate or hinder technology adoption. This theory states that the rate of adoption and ease of implementation of an innovation depend on five general attributes: relative advantage, compatibility, complexity, observability, and trialability (Rogers, 1983). Rogers's diffusion theory is helpful in analysing the different factors which can ease or impede the adoption of technology. These attributes are helped in understanding the prospects of an organisation adopting or rejecting innovation (Rogers, 1983). The rate at which new technologies and ideas are transferred from one culture to another and how and why they are used individually and cumulatively can be understood in terms of the theory of DOI. A person's willingness to change is varied from person to person. Hence, the response towards the change is typically affected by the passage of time (Rogers 1995). In order to understand individual responses to innovation five following categories of personality are developed, after making segments from the normal distribution, representing the earliest to the latest to adopt the technology. These categories are innovators, early adopters, early majority, late majority, and laggards (Rogers ,1995). The process of adopting an innovation in government organisations is much more complicated. For taking the decision of adopting new technologies in an organisations, most of the key employees should participate in this process.

In an organisation, the leaders characteristics, and of the organisational structure along with external characteristics are independent variables to which innovation has an association, according to the theory of DOI at the level of firm (see figure 4.2). The leader's attitudes are described through individual characteristics. According to Roger's (1995), observation of different instances is done in internal characteristics of organisational structure. It observes the dependency level of individuals. Observing the level of skills, abilities and knowledge is required for the employees to perform their duties. To what extent employees are following rules and regulations of the organisation is known as formalisation. The level of connection between social system and interpersonal networks are identified through interconnectedness. To what degree spare resources are available in an organisation can be identified as organisational slack. The employees in the organisation show its size. How much the system of an organisation is open can be identified through external characteristics.

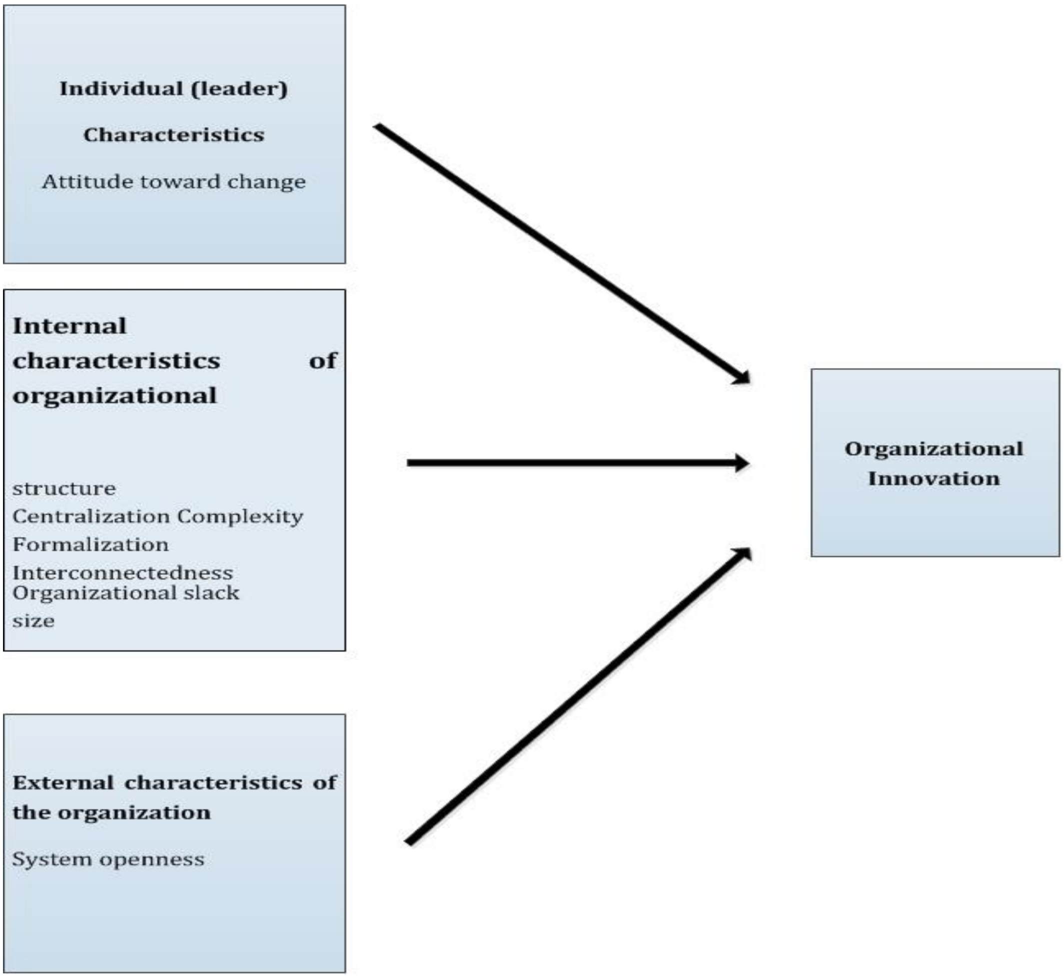


Figure 3.2: Diffusion of innovations (Rogers 1995)

3.1.3 Institutional Theory

The events of the organisation can be explained with entirely different views by institutional theory (Roberts Greenwood, 1997). The methods, regulations, norms, and usual tasks develop for social behaviour can be explained through this theory. Relevant information about how routine and standards are composed, broadcasted and accepted over space and time through this. This theory also assists in obtaining information about how one unit in a group mirrors the unit that suffers from the same problems in the environment (Scott, 1995; King et al., 1994; Abrahamson and Rosenkopf, 1993).

The primary focus of institutional theory is on the institutional environment which plays a major role in aligning the structure and actions of the organisation (Scott and Christensen, 1995; Scott, 2001). Efficiency depends on not only the decisions of the organisation but also the rituals of the society and the legal, environmental factors in which the organisation is operating. Cultures, structures, and routines operating at various levels help in the progress of the organisation. The requirement to work legally and isomorphic pressure result in establishing homogeneous firms, as per the theory (Dimaggio and Powell, 1983). Due to the market competition this excites the companies to follow industry trends. The technological, organisational framework is coordinated with an institutional theory under certain researches (Gibbs and Kraemer 2004, Li 2008, Soares-Aguiar and Palma-Dos-Reis, 2008). This externally pressurizes the environmental context of the framework. This in turn involves the pressure exerted by partners of trade and competitors.

3.1.4 Technology Acceptance Model (TAM)

The technology acceptance model (TAM) was originated by Davis et. al.(1989) It proposes an informal connection between the main variables of perceived ease of use (PEOU) and perceived usefulness (PU) and users' behavioural objective, attitude and literal system implementation and usage (Davis, 1989). Its purpose is to define and also assume the factors that have an impact on behavioural objective to make use of information or computer systems by observing the effects of external factors on behaviours, internal factors, and objectives. Perceived usefulness (PU) consists of the thoughts of the user that a particular advance such as in information technology can enhance his or her productivity. The attitude toward the use (AT) is realised by PU and PEOU. Perceived ease of use (PEOU) includes the user’s probability in regards to the exertion applied for utilising information technology advancements (Davis et. al., 1989). In addition, behavioural intention (BI) to use is mutually realised by attitude towards the use (AT) and perceived usefulness (PU). Finally, the actual use of the system is realised by behavioural intention (BI) (Gentry and Calantone, 2002).

The TAM has been applied to the research into the case of computers and software applications, for example word processing, and spreadsheet software and email (e.g. Davis, 1993; Mathieson, 1991; Davis et al., 1989). Davis’ technology acceptance model (TAM) implements research from within the information systems (IS) context; it is commonly used in the dispersion of innovation systems. With the recent advances in internet and related technologies, many studies have used the TAM in research (Jiang et al., 2000), organisational contexts (Venkatsh and Davis, 1996), digital library systems (Davies, 1997) and telemedicine (Karahanna et al., 1999).Rose and Straub (1998) expanded Davis's (1989) Model to study why and how IT equipment if or if not been implemented by less developed countries (LDC). This representation exists in five Arab countries (Jordan, Egypt, Lebanon, UAE and Saudi Arabia) with the objective of determining factors to bring to practice. According to the authors, TAM relocates productively and suggests an analysis of prospective research of cultural feature. Moreover, Gentry and Calantone (2002) discovered that the TAM is better for defining inconsistency in behavioural intention contained by a researching techniques and the authors considered that this is partly because of, TAM's use of two individual concepts— Ease of Use and Perceived Usefulness, that help to determine attitudes in a diverse manner (Gentry and Calantone, 2002).

Several authors have pointed out that perceived ease of use and perceived usefulness are merely basic measures of users' approval of information systems (Park et al., 2008). Like Davis (1989) debates that study should bring forward such components that have an effect on the factor of ease of use, perceived usefulness and could enhance the model's analytical ability as to enhance the description of the approval of technology systems based on individual technology implementation perspective. For that reason, studies have shown that the analytical capability of the TAM is restricted, difficult to augment and should be comprehensive to embrace added constructs in order to effectively define behavioural intention to use information technology (Lopez-Nicolas et. al., 2008; Legris et al, 2003). It has been concluded that, even though, the TAM has been extensively applied for defining technology recognition by users, there has been much apprehension in regards to the feasibility and completeness of the model.

3.1.5 Iacovou et al. (1995) Model

Iacovou et al. (1995) studied inter-organisational system (IOS) factors that persuade firms to implement IT systems in the respect to EDI implementation. Their model is founded on three concepts: perceived benefits, organisational readiness, and external factors (see Figure 4.3). Their structure is well constructed to define the implementation of an IOS. IT resource is same as to technology framework, and financial resource is same as an organisational framework. The external factors in the Iacovou et al.'s (1995) model include the business associate to the outer task environmental framework of the TOE structure as an essential key to IOSs implementation. Therefore, perceived benefit is a separate from the TOE structure while on the other hand organisational readiness is a combination of the technology and organisational factors in the TOE. Organisation acceptance is commonly practiced in all three structures in the context. The environment is coming from the TOE structure. Perceived advantages, external factors emerge from the Iacovou et al. (1995) model. Oliveira and Martins (2010b) implemented the TOE structure, and the Iacovou et al. (1995) model to the implementation of e-business by businesses in the European Union (EU) countries, by contrasting the impact between two industries, namely, tourism and telecommunications.

The perceived benefits emerge from Iacovou et al. (1995) model. The technology and organisational readiness is a collaboration of TOE coming from the Tornatsky and Fleischer (1990) structure and organisational acceptance from the Iacovou et al. (1995) model. The environmental and external pressure emerges from the collaboration of the previous studies. This planned model includes the three factors of organisational readiness, technology and perceived benefits external and environmental pressure.

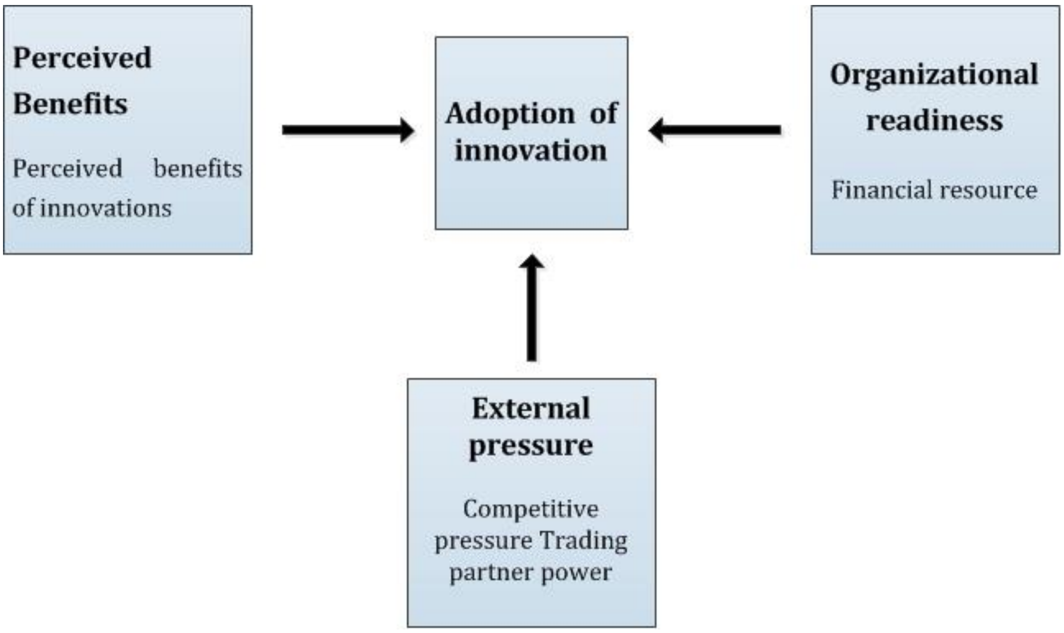


Figure 3.3: Iacovou et al.'s (1995) model

3.1.6 Theory of Planned Behaviour (TPB)

The TPB suggests that an individual reaction depend upon behavioural intentions. Behavioural intentions are the performance of an individual's reaction to behaviours; the prejudiced system embraces the deliverance of actions, and the individual's perception of the ease with the help of which reaction can take place (behavioural limitation). It has been effectively implemented to the perception of significant approval of diverse technologies (Harrison et al., 1997, Taylor and Todd, 1995, Mathieson, 1991). Its reaction in relation to behaviour is explained as the individual's constructive or destructive emotions regarding the reaction of behaviour. Individual standards are described as a person's concept, as to if a person is significant in the individual perspective, deliverance of behaviour should take place. Behavioural limitations consist of two individual’s perception of the ease or trouble with delivering concerned behaviour (Eagly and Chaiken, 1993; Ajzen, 1991).

Harrison et al. (1997) applied the TPB to define and determine small scale business supervisor’s judgement to implement IS systems. The result displays sustenance for an assessment course, depending upon the reaction (perceived constructive and destructive situations in the business), subjective norm (social predictions), and perceived limitation (assists to fight difficulties) in respect to IS systems implementation. Theory of designed reaction has been effectively implemented to different circumstances in realising the reaction of behaviour and purpose, like purpose to apply a latest software function (Mathieson, 1991). TPB needs an exceptional operation in various diverse conditions to which it can be implemented (Ramdani, 2008; Mathieson et al., 2001). Furthermore, Ramdani (2008) debate that TPB is not definite to IS practice and is not economical as compared to TAM.

3.1.7 Integrating DOI, Institutional Theory, and TOE

It is known that various cultures have varying distribution system for the following the modernization and new innovations. Huang and Palvia (2001) suggested that the utilisation of information technology in developing countries faces difficulties and sturdy opposition which may be related to national problems such as the concept that technological inventions belittle individual communication. As stated by Dunphy and Herbig (1995), the current cultural situation constantly regulates if, when, how, and under what conditions a new invention will be implemented. Moreover, studies highlight that a prime and delayed connection with distribution procedure varies from country to country and brings out cross-national dissimilarity (Dunphy and Herbig, 1995).

In reality, the TOE framework, Iacovou et al.'s (1995) model, and the DOI theory gives a rational and solid theoretical expansion for researching technological inventions (Zhu et al., 2006a). After thorough revision the context of IS inventions, the theory on diffusion of innovation (DOI) ,Iacovou et al. (1995) model, and the TOE framework are considered to be the most suitable theoretical basis for understanding the adoption of cloud computing at organisation level. Furthermore, implementing TOE framework assists to sustain and make stronger what has been mostly overlooked in the DOI theory, like the organisational situation of a possible implementer and its functional ground (Zhu et al., 2006a).

Table 3.2 show a comparison of studies that combined and used various theoretical models for the same study. It shows that, it would be theoretically and practically possible to merge more than one theory and model, in order to cover more aspects of the problem, is being studied. From this table, some important factors are adopted to be using in this study.

Table 3.2: A comparison of studies that combine various theoretical models and variables.

Model	IS Adoption	Variables Examined	Methodology	Source
TOE and DOI	RFID	Technology : relative advantage; complexity; compatibility. Organisation : top management support; firm size; technology competence. Environment : competitive pressure; trading partner pressure; information intensity.	e-mail survey;	(Wang et al., 2010)
TOE and Iacovou et al. (1995) model	E-business	Perceived benefits : perceived benefits and obstacles of e-business. Technological and organisational readiness : technology readiness; technology integration; firm size. Environment and external	Telephone interview	(Oliveira and Matins 2010b)

		pressure : competitive pressure; trading partner collaboration. Controls :country and industry effects.		
TOE	E-business	Technological context : technological readiness; technology integration; security applications. Organisational context : access to the IT system of the firm , electronic correspondence perceived benefits, IT training programmes, internet and e- mail norms. Environmental context : web site competitive pressure Controls :Services sector.	Telephone interview	(Oliveira and Martins 2010a)
TOE	KMS	Technology aspect : Organisational IT competence; KMS characteristics (compatibility, relative advantage and complexity). Organisational aspects : top management commitment; hierarchical organisational structure. Environmental aspect s: external vendors; among internal employees.	Not empirical	(Lee et al. 2009)
TOE and DOI	e-commerce	Innovation attributes : relative advantage; compatibility; complexity. Environmental : expectations of market trends; competitive pressure. Information sharing culture : trust; information distribution; information interpretation. Organisational readiness : top management support; feasibility; project champion characteristics	e-mail survey	(Chong et al. 2009)
TOE, DOI and Institutional theory	E-procurement	Technological context: relative advantage; complexity; compatibility. Organisational context : financial slack; top management support. Environmental context : external	Telephone interview	(Li 2008)

		pressure; external support;		
TOE	Internal integration of e-business External diffusion of use of e- business	Technological context: IS infrastructure; IS expertise. Organisational context : organisational compatibility; expected benefits of e-business. Environmental context : competitive pressure; trading partner readiness.	e-mail survey	(Lin and Lin 2008)
TOE and Institutional theory	Electronic procurement systems (EPSs)	Technological context: Technology competence; IT expertise; B2B know how. Organisational context : firm size; firm scope. Environmental context : trading partner readiness; extent of adoption amongst competitors; perceived success of competitor adopters. Controls : Industry effects.	e-mail survey	(Soares-Aguiar and Palma- Dos-Reis 2008)
TOE and DOI	E-Business usage E-business impact	Relative advantage Compatibility Costs Security concern Technological context : technological competence. Organisational context : organisation size. Environmental context : competitive pressure; partner readiness.	Telephone interview	(Zhu et al. 2006a)
DOI, TOE and Iacovou et al.'s (1995) model	E-business use: diversity, and volume.	Perceived benefits : perceived of innovations. Organisational readiness : firm size; technology resources; globalization level. External pressure : trading partners' pressure; government pressure. Environment : regulatory concern; competition intensity. Controls : Industry effects.	Telephone interview	(Hsu et al. 2006)
TOE	E-Business usage	Technological context : technological competence. Organisational context : size; international scope; financial commitment.	Telephone interview	(Zhu and Kraemer 2005)

		Environmental context : competitive pressure; regulatory support. e-Business functionalities : front-end functionality; back-end integration.		
TOE and Institutional theory	Scope of e-commerce use	Technology context : technology resources Organisational context : financial resources, perceived benefits, firm size, organisational compatibility	Telephone interview	(Gibbs and Kraemer 2004)

3.2 Review of Factors Affecting the Adoption of Technology

In the previous studies independent and dependent variables were examined as factors in light of IS theories to enrich the understanding of how new technologies will be adopted. It has been noticed that rarely all the potential factors which effect on adoption of new technologies are combined in one comprehensive model (Brancheau and Wetherbe, 1990; Cooper and Zmud, 1990).

Table 3.3 gives a summary of studies conducted to measure the adoption level of the technology at the organisation level. Each study contains some factors which are not the same in all studies. Some factors are important and selected in a study while not required in other studies (Sameni and Khoshalhan, 2009). Also, it leads to developing the three main themes that are described in the next section.

Table 3.3: Key previous studies examining the determinants of the adoption of IS innovation					
Source	**Study Level**	**Subject studied**	**Methodology**	**Variables**	**Key findings**
Teo al. (2009)	Organisation	Electronic procurement	Survey questionnaire	**Dependent Variables:** e-procurement adoption **Independent Variables:** Perceived direct benefits Business partner influence Top management support Perceived indirect benefits Information sharing culture Perceived costs Firm size	Top management support, perceived indirect benefits, firm size, and business partner influence are positively associated with e-procurement adoption. Industry type does not show any relationship with e-procurement adoption.
Lin (2008)	Organisation	E-business implementation	Survey questionnaire	**Dependent Variables:** e-business implementation success **Independent Variables:** Perceived relative advantage Compatibility Complexity Organisational learning capabilities	Perceived relative advantage, compatibility and organisational learning have a significant effect on e-business implementation success.
Ramdani and Kawalek (2008)	Organisation	Enterprise systems (ESs)	Interviews	**Dependent Variables:** Willingness to adopt ES **Independent Variables:** Compatibility Complexity Trialability Observability Top management support Organisational readiness IS experience Size Industry Market scope Competitive pressure	Firms with a greater perceived relative advantage, a greater ability to experiment with ES before adoption, a greater top management support, a greater organisational readiness and a larger size are predicted to become adopters of ES.

				External IS support	
Lin and Lee (2005)	Organisation	E-business adoption	Survey questionnaire	**Dependent Variables:** E-business systems adoption level **Independent Variables:** Organisational learning Knowledge management	Organisational learning and knowledge management processes are closely related to the level of e- business systems adoption. Firms with greater levels of technical expertise and e-business knowledge attain higher levels of e-business systems adoption.
Pérez et al. (2004)	Organisation	Tele-working	Survey questionnaire	Dependent Variables: Tele-working adoption **Independent Variables:** Human resources Technological resources Organisational resources	Teleworking firms use more ICTs, invest more resources in R & D, have a larger percentage of knowledge workers and salespeople in the workforce, and have a larger geographical market.
Lertwongsatien and Wongpinunwatana (2003)	Organisation	E-commerce	Survey questionnaire	**Dependent Variables:** E-commerce Adoption decision **Independent Variables:** Perceived Benefits Compatibility Size Management Support Existence of IT Department Competitiveness	Firms that strongly support the use of Information Technology, by formally establishing IT departments, are more likely to adopt e-commerce earlier than firms with less IT support. Firms that have IT assets (i.e. IT knowledge, IT capabilities) are more likely to adopt and implement e-commerce than firms that need to start building technology knowledge and infrastructure required for e-commerce adoption.
Sanchez and Perez (2003)	Organisation	Electronic data interchange (EDI) adoption	Survey questionnaire	**Dependent Variables:** EDI Adoption Scope of EDI use **Independent Variables:** Operational benefits Strategic benefits Cost difficulties Technical difficulties Organisational difficulties External pressure Supply dependence Mutual understanding Experience of EDI	Organisations that adopt EDI perceive more operational benefits, more external pressure and mutual understanding, and fewer technical and organisational difficulties than non-adopters of EDI. Companies use EDI to become more coordinated with suppliers and customers.
Scupola	Organisation	Internet	Qualitative	**Dependent Variables:** Internet commerce	E-commerce benefits, barriers, the quality of access to suppliers of technology-related services, government

(2003)		commerce		adoption & implementation **Independent Variables:** Benefits Barriers Employees' IS knowledge Financial resources Technological resources Size Government intervention Public administration External pressure	intervention, pressure from buyers, suppliers and competitors are very important in Internet commerce adoption and implementation
Wu et al. (2003)	Organisation	Electronic business (e-business)	Survey questionnaire	**Dependent Variables:** E-business adoption and performance outcomes **Independent Variables:** Management support Organisational learning Customer orientation Competitor orientation Customer power Normative pressures	A significant influence on the overall intensity of e-business adoption. The communication and internal administration aspects of e-business positively affect performance outcomes.
Waarts et al. (2002)	Organisation	Enterprise resource planning (ERP) software	Survey questionnaire	**Dependent Variables:** ERP adoption **Independent Variables:** Perceived advantages and disadvantages Compatibility Attitude Company IT resources IT intensity IT integration Parent company Industry competitiveness Supply-side competition	Internal strategic forces, the attitudes of the firm, and external factors like competition and supplier activities are important determinants at the early stages of the diffusion process of ERP. Implementation issues such as the scalability of the system, the available budget are important determinant of the late stages of the diffusion process of ERP.

Chassion and Lavato (2001)	Organisation	Decision support system	Case study	**Dependent Variables:** IT diffusion **Independent Variables:** Subjective norms Adoption stage User competence Implementation process Organisational factors Perceived innovation characteristics	Users draw upon a wider range of perceived characteristics of innovation during the early stage of adoption and reduce their focus to commutability and relative advantage during later stages.
Mehrtens et al. (2001)	Organisation	Internet	Case studies	**Independent Variables:** Perceived benefits Organisational readiness IT knowledge External pressure **Dependent Variables:** Internet adoption	Perceived benefits, organisational readiness, and external pressures significantly affect internet adoption by small firms. High penetration level is EDI vendors and IT vendors should consider developing appropriate strategies and plans to promote the adoption of EDI among organisations.

3.3 Theme 1: Technology and Organisational Readiness

The features of an innovation and its significance and "fit" into an organisation's internal processes are referred as the technological context (Tornatzky and Fleischer, 1990). Roger (1995) found that the pace at which technological innovation is adopted is determined to a large extent by the perceived characteristics of the innovations themselves. According to Tornatzky and Klein (1982), compatibility, complexity and relative advantage are the three main technological factors that have an impact on the decision to adopt an innovation. A particular technological innovation is adopted after determining how useful the innovation is and how it will fit into the organisation's objectives. Tornatzky and Fleischer (1990) explained that organisational context refers to a series of processes or features of an organisation that describes those structures and processes which either restrict or aid in adopting a technological innovation. According to these authors, the organisation has financial and human resources, which could help in removing the obstacles to adopting technological innovations. When it is not possible to attain relative advantage by using a technological innovation because of a shortage of organisational resources, the process of adoption will be slower, no matter how vital the advantages are. It has been stressed by Tornatzky and Fleischer (1990) that the adoption process is likely to be smoother when an organisation possesses adequate organisational resources, including adequate funds and technical expertise. The level of financial and technological resources existing within an organisation is called organisational readiness. These aspects are considered to find out how significant they are to the adoption of cloud computing.

3.4 Theme 2: Environmental and External Pressure

Activities are carried out organisations within an environmental setting. It has been suggested by scholars of innovation that organisations receive pressures from the external environment such as resources, information, and technology and obstructions such as regulation, and constraints on capital or in terms of information (Damanpour and Schneider, 2006). Market structure, including competition and concentration is presumed to be the most important environmental factor for business organisations that has an impact on their use of the technological product and process innovations. The way the environment affects the organisation can be called external pressure (Iacovou et al., 1995), and this plays an important part in encouraging organisations to embrace IT and Internet-based technologies. When organisations receive external isomorphic pressures from competitors, customers and trading partners, it is expected that they are going to be encouraged to adopt and employ e-commerce, as pointed out by Iacovou et al. (1995), Premkumar et al. (1997), Rueylin (2001) and Hadaya (2008). The decision to employ web services is affected by the technology that has already been implemented or refused and by those associated with the partnerships that allow for producing, distributing and using the products and services.

The most significant issues that have an impact on the adoption of cloud computing include privacy and security matters, as has been found in a review of the cloud computing literature (Andersen and Dawes, 1991; Caffrey, 1998; Irvine, 2000; Moon, 2002; Holden et al., 2003). Here, the role played by the organisational environment is known as the external pressure to adopt. There are two primary sources of this external pressure, and the first is the competitive pressure. The second is the pressure applied by trading partners (Iacovou, Benbasat et al., 1995).

It has been agreed in previous studies that the adoption of innovation is essentially brought about by support of the regulatory environment (Raymond, 1985; Premkumar and Roberts, 1999). It has also been found that when a certain government demonstrates a clear dedication to the new technology, the new technology would be considered in a more favourable light by prospective adopters and hence the chances to adopt it become higher (Yu-hui, 2008). In addition, it has also been found that the concept of regulatory environment holds similarities to the government policy (Zhu and Kraemer, 2005; Dasgupta et al., 1999; Umanath and Campbell, 1994).

It has often been found that the adoption of innovations may also be influenced by the role played by the government, particularly in developing countries (Molla and Licker, 2005a; Ang et al., 2003; King et al., 1994; Montealegra, 1999). For example, inadequate support from the government served as a substantial obstruction to the adoption of online banking in Oman (Khalfan and Alshawaf, 2004). Another study showed that a lack of appropriate regulations and policies served as a significant hindrance and the grave restriction to the adoption of technology in Turkey (Kaynak et al., 2005).

3.5 Theme 3: Perceived Benefits

Many studies have been carried out to identify the possible benefits of technology. According to Pfeiffer (1992), these can be classified into two groups that are somewhat similar to the two integration levels discussed earlier. The first group includes direct benefits, which are mainly the operational savings linked to the organisation's internal productivity. The second group includes indirect benefits or opportunities which are brought about by the effect of technology on the business processes and relationships.

These benefits are, to a large extent, tactical and competitive advantages (Iacovou et al., 1995).

3.6 The Proposed Conceptual Model

The TOE framework is a sound theoretical structure and includes practical sustenance, and the probable submission to IS implementation (Oliveira et al. 2011b) The TOE framework includes environmental factors, which are not contained in DOI theory, and it enhances the ability to describe intra-corporation invention and implementation. Hence, it can be concluded that this model is most suitable and comprehensive for the specific requirements of Saudi Arabia government. According to the literature, IT adoption models at the business level, frequent observed studies are found within the DOI theory and the TOE framework. Therefore, an elaborate study of the TOE framework took place to understand empirical studies that only practice the TOE model, and empirical findings connect this model to the Iacovou et al. (1995) model, and highlights that similar framework in a particular theoretical sample can possess dissimilar factors. Consequently, this study applies two TOE and Iacovou et al. (1995) model to get improved knowledge, to determine the most suitable cloud computing adoption factors for Saudi government sector.

This study concentrates on the factors that influence the adoption of cloud computing by carrying out an investigation at the organisational level. The organisational drivers of and barriers to the adoption of cloud services can be assessed holistically by using a theoretical model that takes into account the various aspects of cloud computing as well as the wider context in which this innovation is carried out. Tornatzky and Fleischer (1990) presented the TOE framework, in which the particular firm context of the organisational adoption decision-making procedure is discussed. This framework does not act as a distinct model for determinants; rather it offers a classification through which the factors that aid or hamper the adoption and execution of IT-based innovations are categorized in terms of organisational, technological or environmental context. IS researchers have employed the TOE framework, to study the organisational adoption of e-business (Zhu et al., 2004; Zhu and Kraemer, 2005), open systems (Chau and Tam, 1997) and Internet use (Mishra et al., 2007), and this is the reason that the TOE framework is used in this study. In addition, Iacovou et al. (1995) found it to be relevant and applicable for categorising the factors important in cloud computing adoption.

3.6.1 An Integrative Conceptual Model

The proposed conceptual framework combines two IS models and consists of three main themes as shown in figure 4.4:

Theme No.1: Technology and Organisational Readiness, as used in the TOE model and Iacovou et al.'s (1995) model

Theme No.2: Environment and External Pressure, as used in the TOE model and Iacovou et al.'s (1995) model"

Theme No.3: Perceived Benefits, as used only in Iacovou et al.'s (1995) model.

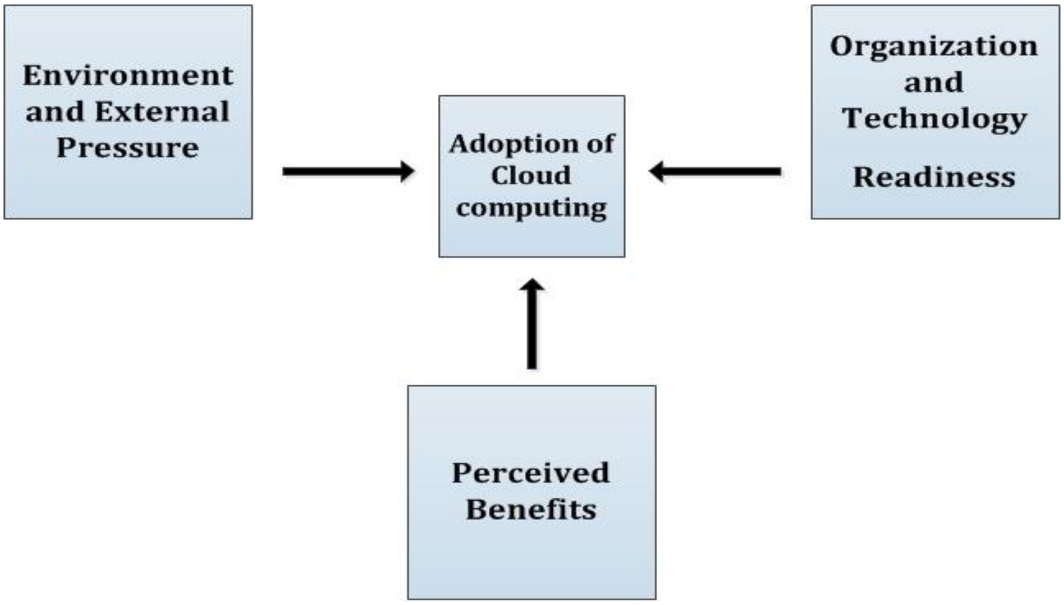


Figure 3.4: Integrated conceptual model of the adoption of Cloud computing at the organisational level

3.6.2 Research Model and Hypotheses Concerning Cloud Computing Adoption

Based on the literature reviewed, a number of hypotheses are proposed in this study. The constructs involved are service quality, usefulness, security concerns, complexity, cost, organisation size, IT infrastructure readiness, feasibility, trust, organisational culture, organisational structure, privacy risk, government support, regulatory concerns, external pressure, culture, industry type, direct benefits, and indirect benefits (see Table 3.4). These factors have been established in the literature as critical predictors of technology adoption. Figure 4.2 illustrates the proposed model for Cloud computing adoption in Saudi Arabia and shows the relationship between the independent and dependent variables.

Table 3.4: Research Hypothesis		
HN	**Independent Variable**	**Dependent Variable**
H1	Service quality	Cloud computing adoption
H2	Usefulness	Cloud computing adoption
H3	Security concerns	Cloud computing adoption
H4	Complexity	Cloud computing adoption
H5	Cost	Cloud computing adoption
H6	Organisational size	Cloud computing adoption
H7	IT infrastructure readiness	Cloud computing adoption
H8	Feasibility	Cloud computing adoption
H9	Trust	Cloud computing adoption
H10	Organisational culture	Cloud computing adoption
H11	Organisational structure	Cloud computing adoption
H12	Privacy risk	Cloud computing adoption
H13	Government support	Cloud computing adoption
H14	Regulatory concerns	Cloud computing adoption
H15	External pressure	Cloud computing adoption
H16	Culture	Cloud computing adoption
H17	Industry type	Cloud computing adoption
H18	Direct benefits	Cloud computing adoption
H19	Indirect benefits	Cloud computing adoption

3.6.2.1 The Service quality

H1: Service quality will have a positive and significant effect on cloud computing adoption.

3.6.2.2 The Usefulness

H2: Usefulness will have a positive and significant effect on cloud computing adoption.

3.6.2.3 The Security concerns

H3: Security concern will have a negative and significant effect on cloud computing adoption.

3.6.2.4 The Complexity

H4: Complexity will have a negative and significant effect on cloud computing adoption.

3.6.2.5 The Cost Effectiveness

H5: Cost will have a positive and significant effect on cloud computing adoption.

3.6.2.6 The Organisation size

H6: Organisation size will have a significant effect on cloud computing adoption.

3.6.2.7 IT infrastructure readiness

H7: IT infrastructure readiness will have a positive and significant effect on cloud computing adoption.

3.6.2.8 The Feasibility

H8: Feasibility will have a positive and significant effect on cloud computing adoption.

3.6.2.9 Trust

H9: Trust will have a positive and significant effect on cloud computing adoption.

3.6.2.10 Organisational culture

H10: Organisational culture will have a negative and significant effect on cloud computing adoption.

3.6.2.11 Organisational structure

H11: Organisational structure will have a significant effect on cloud computing adoption.

3.6.2.12 Privacy risk

H12: Privacy risk will have a negative and significant effect on cloud computing adoption.

3.6.2.13 Government support

H13: Government support will have a positive and significant effect on cloud computing adoption.

3.6.2.14 Regulatory concerns

H14: Regulatory concerns will have a negative and significant effect on cloud computing adoption.

3.6.2.15 External pressures

H15: External pressure will have a positive and significant effect on cloud computing adoption.

3.6.2.16 Culture

H16: Culture will have a negative and significant effect on cloud computing adoption.

3.6.2.17 The Industry type

H17: Industry type will have a significant effect on cloud computing adoption.

3.6.2.18 Direct benefits

H18: Direct benefits will have a positive and significant effect on cloud computing adoption.

3.6.2.19 Indirect benefits

H19: Indirect benefits will have a positive and significant effect on cloud computing adoption.

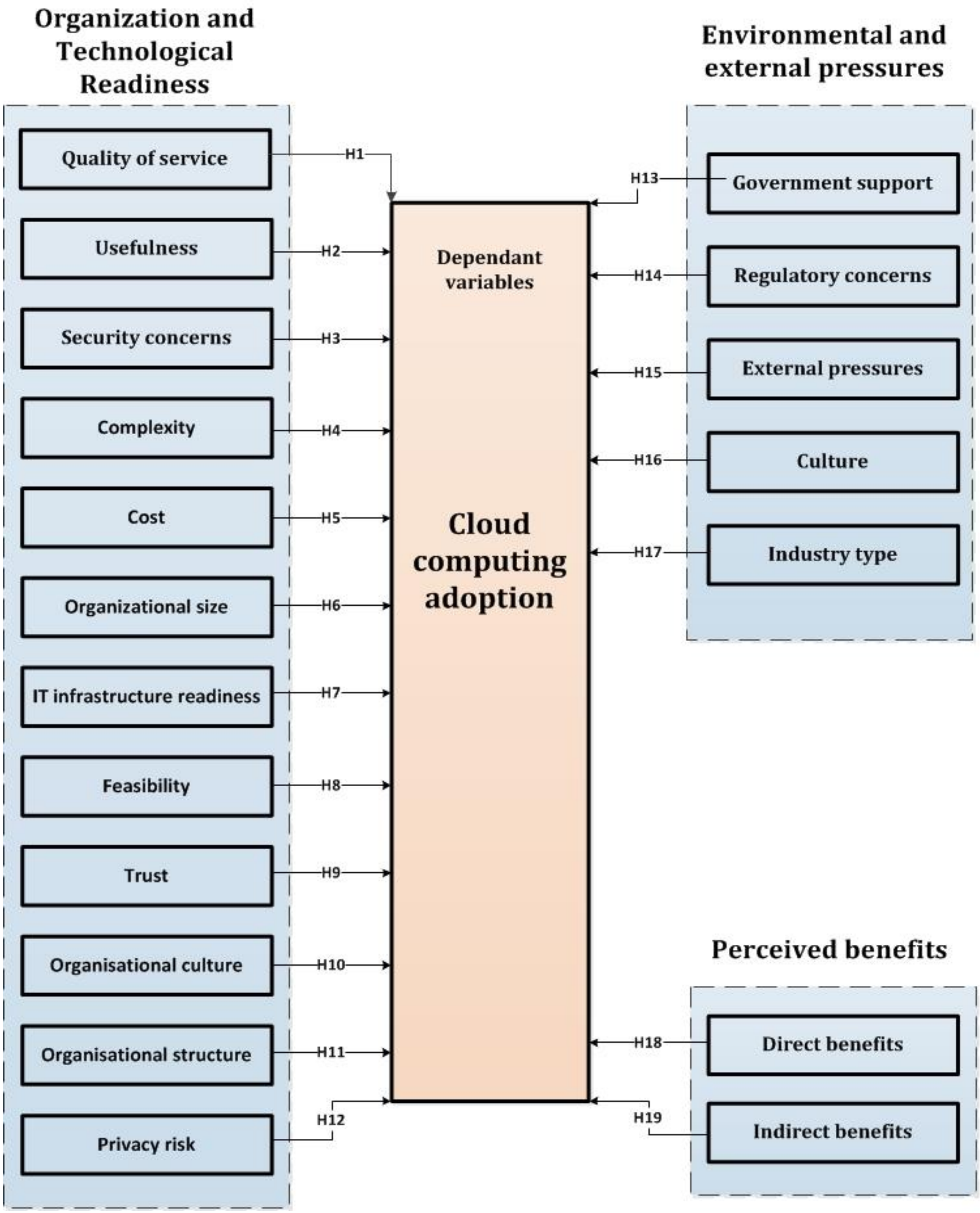


Figure 3.5: Research Model of Cloud Computing Adoption in the Public Sector

3.6.3 Validation of the Proposed Conceptual Model in Fieldwork

The conceptual model proposed above incorporates two distinct models to give a comprehensive framework for the study of the adoption of cloud computing in the public sector companies. Hence, in the following phase of this research, the validity of the suggested framework is practically tested by the analysis of data gathered in fieldwork.

3.7 Chapter Summary

In this chapter, a review of the relevant literature has been carried out, and a conceptual framework that includes the TOE framework and the model presented by Iacovou et al. (1995) has been created. This model is considered to be a comprehensive model for investigating the adoption of cloud computing in the public sector organisations.

The review of literature also showed that frameworks examining IT adoption in a complex context, such as public sector organisations need to take into account aspects such as the kind of technology involved, the abilities of the organisation, and the external environment. These are considered to be explanatory factors in various studies. These are the categories identified in the TOE framework by Tornatzky and Fleischer (1990), and have been incorporated into the conceptual framework of the adoption of cloud computing. This framework is based on strong theory, and has been empirically tested and has been proven to be a valuable starting point for comprehending the adoption of cloud computing. In addition, it is possible to implement this in any organisation which has the same context.

By incorporating the TOE factors and Iacovou et al.'s (1995) model, a conceptual framework can be developed for cloud computing adoption which will offer valuable insight into the adoption of cloud computing processes and to understand the boundaries of the adoption of cloud computing problem.

4 RESEARCH METHODOLOGY

The aims and objectives of the research study will be achieved with the help of a research philosophy and methodologies which are discussed in this chapter. The reasons for the selection of each approach along with the epistemological underpinnings of the research are explained in the first section. Then, the research approach, design and strategy chosen are discussed after an initial analysis of positivism and interpretivism, and justifications are given for specific research methods have been selected.

The chapter is divided into three stages, the first of which focuses on the relevant definition of along with the factors which affect the adoption of cloud computing used to design the conceptual framework.

The second section explained the design of a survey that has been conducted using a questionnaire in order to collect primary data. This survey is intended to help in evaluating the dimensions of the proposed framework. Finally, case studies are designed. These case studies assist in testing the proposed framework for investigating Saudi Government organisations.

4.1 Selection of an Appropriate Research Approach

Selecting a suitable research approach is one of the most important aspects of a study. Many different kinds of research approaches and methods are described in the literature, which is why it is necessary to choose the correct one for a specific study. In the contemporary world, technologies and methods of researching are expanding, and many research approaches have been developed in different disciplines of the natural and social sciences. Many philosophical assumptions may be made by researchers in the field of information systems research, since this is regarded as a multi-disciplinary field (Orlikowski & Baroudi, 1991). Hence, there is no single framework which takes into account all aspects of knowledge about IT (Galliers, 1992). Since the 1990s, the public sector context and IT adoption is the most commonly used research disciplines that are present in the range of different IT adoption studies (Norris & Lloyd, 2006).

Epistemology is a branch of philosophy which considers the philosophical issues that are present in theories of knowledge. Many questions regarding the nature of knowledge are discussed along with how knowledge is obtained (Fetzer, 1993). The philosophical assumptions which have the ability to attach itself to the epistemology present to conduct the research are the ones that are most valuable (Myers & Avison, 2002). For the purpose of this research, the cloud computing adoption literature will be presented for the epistemological stance since it is the most relevant when discussing the different kinds of research philosophies.

4.2 Research Philosophy

The study of information system (ISs) consists of three main types of paradigms or schools of thought used for the purpose of conducting empirical studies. These are the interpretivist school, the critical social school and the positivist school (Orlikowski & Baroudi, 1991; Galliers, 1991; Walsham, 1995; Myers 1997; Oates, 2006). Social science paradigms are also multi-disciplinary which is why it is possible to adopt paradigms from these fields for the study of IS (Orlikowski & Baroudi, 1991). In order to gain knowledge or conduct research, a paradigm helps to provide a set of shared assumptions or ways of thinking (Oates, 2006).

Achieving objectivity and discovering realities that are replicated by others is an important requirement, according to the positivist school of thought (Myers, 1997; Walsham, 1995). Positivist researchers believe that this approach is the best in order to discover a phenomenon as well as to make a prediction. With the help of scientific methodologies, objectivity is attained by the use of statistical methods to test a theory and draw conclusions independently without any biases (Myers, 1997). The main assumption in this type of method is that there exists an objective reality in the world which can be extracted with the help of scientific methods. Relationships between variables are measured in a scientific and statistical manner (Cassell & Symon, 1994) after being isolated as dependent and independent variables. With the help of this activity, it is possible to predict and explain the required issue under analysis (Ngwenyama & A. S. Lee, 1997; Cassell & Symon, 1994).

According to the interpretivist school of thought, constructivist approaches are used since it is believed that there is no reality or clear objectivity present in the world (Cassell & Symon, 1994). Certain social phenomenon emerges from the interaction of individuals which cannot be studied in an objective manner. The interpretivist school of thought believes that human beings relate to each other to form a social construct which they consider to be reality. This is thought to be an ontological question which is contingent upon human meaning systems (Walsham, 1995; Lee, 1991; Lincoln & Guba, 2000; Oates, 2006).

The meaning of finding is actually created when there is inter-subjectivity between researchers and researchs which are explained by the epistemological position. Social reality is accessed with the help of language, and it is only due to consciousness and shared meaning that the value is ascribed to the knowledge which is constructed by human beings (Myers, 1997). The complexity of human sense-making should be managed along with dealing with the meaning interpretations as well as human behaviour when it comes to interpretivist school's methodological question. Observed human actions must be interpreted in an efficient manner rather than basing the study on data and facts already available (Myers 1997; Lee 1991).

In contrast to the positivist and interpretative schools, the critical school believes that reality can be defined through a discourse and it is historically constituted (Orlikowski & Baroudi 1991). Due to this, an ontological position which is socially and historically constituted by ethnic, cultural, social, gender and political domination. There is an interactive link with the research and the object under investigation according to the epistemological position. Hence, there is the value present in the social world (Guba & Lincoln 1994).

Through this research, the idea is to remove all inequitable and unjust critical analysis that is present. There are several conditions present in society which the people require to be removed and with the help of this research it will be possible to extract those conditions (Oates 2006). Certain requirements need to be fulfilled by this method apart from being similar to the interpretive school of thought. The main characteristics of these three schools of thoughts methods are summarised in Table 5.1.

Table 5.1: Characteristics of research paradigms

Philosophy	Description	Characteristics	References
Positivism	To understand the phenomenon in a predictive manner, the Positivist studies test theories. When data is taken from a sample of a population using formal propositions, quantifiable variables measured, hypothesis tested, inferences and conclusions drawn then it can be said that the research is positivist.	• Using measurable properties it is possible to describe the objective reality. • Specific and precise data is required. • • Instrument and researcher independent. • Quantitative data is presented. • Testing of theory is required. • Independent knowledge of facts • Hypothesis testing carried out.	Straub et al., (2004: 2005) Walsham (1995); Oates (2006). Yin (2003a); Lee and Baskerville(2003); Myers (1997); Remenyi (1998); Denzin and Lincoln (1998); Hussey and Hussey (1997); Orlikowski and Baroudi (1991).
Interpretivism	The idea is to understand that phenomena which is presented by human interpretations. In the case of IS, the interpretive method focuses on understanding the context of the entire system as well as the process that influences and influenced by the information system	• Understanding of phenomenan through the interpretations provided by people. • Qualitative data collected • Used with theories need to be generated. • Keeping in mind contextual and cultural situations, deeper insight of the phenomenon is required. • Subjective and rich data gathered	Lee and Baskerville (2003); Myers (1997). Walsham (1995b) Yin (2003a); Remenyi (1998); Denzin and Lincoln (1998); Hussey and Hussey (1997);

Critical	Social reality is historically constituted and has been created and recreated by people. Even though people are able to change their circumstances, they are constrained by factors such as political, social and cultural domination. A social critique is presented with the help of this method and the alienating and restrictive actions present in the status quo are represented.	• Historical constitution of reality • There exists epistemology that the researcher and the object to be investigated are interacting with each other. • Value is present in the social world knowledge. • Represents the conditions present in society which are unjust and need to be rid of for the betterment of the people. It is not only focuses on explaining the social aspects.	Oates (2006).Guba and Lincoln (1994); Myers and Avison (2002) Lee(1991); Orlikowski and Baroudi (1991);

4.3 Selected Research Philosophy

For the present study, the need to choose appropriate research philosophy, method and approach is crucial since there exist many kinds of Information Systems (ISs) research methodologies and strategies to choose. The public sector cloud computing is adopted as part of this research which is why the depth of the situation can be explained, keeping in mind the view presented by the people as a social aspect towards the phenomenon.

Hence, the research methodology uses the interpretive approach. This choice has been made for the following reasons:

- The phenomena are explained and understood by an interpretive study with the help of the meaning assigned to the people. The context of the information system can only be understood by understanding the process and the influence of the information system and the aspects which influence the information system (Walsham, 1995). With the help of this approach, it will be possible empirically to analyse the factors that promote or discourage the use of cloud computing in a natural environment. The effect of variables such as social, environmental, organisational and managerial factors will also be studied in order to find the impact of these social disciplines on the factors.

- Public sector organisations have been chosen as the unit of analysis, all this a complex social structure affected by the sense-making of the people involved. This means that the use of cloud computing is carried out and managed by people. Hence, the interpretivist approach is considered the most appropriate to use.
- Issues such as managerial, organisational and environmental factors are dealt with the help of using the Cloud computing system. There is no concept of independent facts and values, in this case. Since the positivist approach states that facts which are distinct and independent are present in the knowledge it has been adopted. If formal propositions are made, quantifiable measures of variables took and hypothesis testing carried out, then IS research uses the positivist approach. Keeping in mind all these aspects it has been observed that none is present, in this case, which is why this approach cannot be used. It would only be possible to use this method if the social reality were influenced and restricted by technology. If only the objective facts are analysed as the process of adoption or contextual influences, then it would be considered incomplete.
- Within the organisational context studied, the use of Cloud computing is a complex phenomenon since it influences and is influenced by the phenomenon as time passes. This technology can adapt to the different technological or organisational issues that are present since they affect the services delivered by the organisations to citizens, businesses and other agencies. Hence, a thorough knowledge is required of the system before it is adopted. The activities carried out in adoption should also be analysed along with efficient management staff to be appointed for the purpose of running the system.

The behaviour of the stakeholders along with the socially constructed meaning was kept in mind to select the methodology for interpretations in this report. The cloud computing adoption process was attained at an agency and national level with the help of thorough understanding and analysis. The challenges and issues faced in the adoption of cloud computing are one of the major concerns of the present research. The adoption of Cloud computing was hence being understood by testing a new theory that kept in mind some of the aspects of the interpretivist school along with other theories present in the literature.

4.4 Qualitative and Quantitative Research

There are two main categories of research method, which involve qualitative and quantitative analysis (see Figure 5.1). When the concept, characteristics, definitions, symbols, descriptions, metaphors and meanings applied to things are studied then it can be stated that qualitative research methods are adopted by the researcher (Almogbil

,2005). Data is obtained in this kind of research through documents and texts, interviews and questionnaires, participant observation and the observations of the environment and the impressions of the researcher and his reactions towards the study (Myers & Avison ,2002). The social and behavioural sciences make use of qualitative research in order to gain thorough knowledge about behavioural, cultural and social phenomenon (Almogbil ,2005).

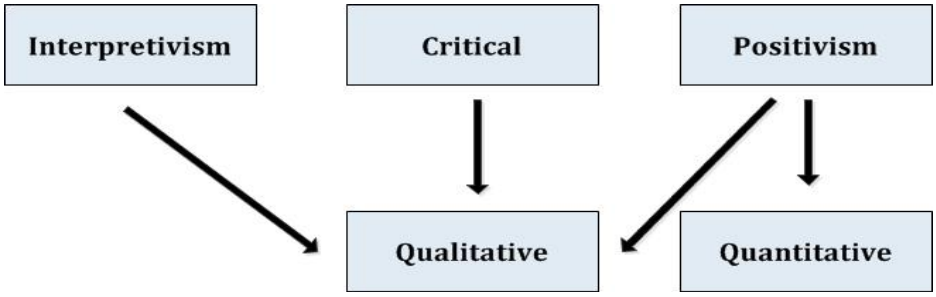


Figure 4.1: Epistemological Assumptions for Quantitative and Qualitative Research (adapted from (Straub et al. 2005))

The attributes, traits and characteristics of things are examined in a quantitative research method (Almogbil 2005) . With the help of survey methods, formal methods such as econometrics, and numerical methods like mathematical modelling or laboratory experiments it is possible to use this method for analysis in the social sciences (Myers & Avison, 2002).

The IS can provide a broad range of research methods and methodologies for the researchers. The focus of this section is clearly to explain the strengths and weaknesses of qualitative research methodology so that it can be adopted appropriately in the present research.

The quantitative and positivist and qualitative and interpretivist approaches are usually confused by researchers. It has been found that the interpretivist and positivist methodologies consist of philosophical stances or orientations for the research being conducted, and this is not the case for the qualitative and quantitative approaches (Remenyi 1998). Many different kinds of scientific traditions are present for the qualitative and quantitative studies along with a wide range of methods of inquiry (Myers & Avison 2002; Maykut & Morehouse, 1994). Many social and cultural phenomena have been analysed by making use of qualitative research methods. If natural phenomena are to be analysed in the natural sciences, then quantitative research methods are usually adopted (Myers & Avison, 2002). The IS research is facing a shift from technological to organisational and management issues which are why it is appropriate to adopt qualitative research methods for analysis. Researchers are growing more interested in this kind of approach since the scope of the research is changing (Benbasat, 1987). Quantitative methods consist of observations broken into discrete units which are compared to other units by making use of statistical tools (Maykut & Morehouse, 1994).

On the other hand, qualitative study takes into account the words and actions of people in their narratives and descriptions regarding their experience. The strengths and weakness of qualitative research are summarised in the following table.

Table 4.1: Strengths and weaknesses of qualitative methods

Strengths	References	Weaknesses	References
Thorough knowledge of the phenomenon and its complexities can be gained	Benbasat et al. (1987) Silverman (2001) Yin (2003a)	Several kinds of interpretations can be presented, which reduces level of accuracy in the results	Silverman (2001)
The IS can be analysed in its natural environment	Maykut and Morehouse(1994) Silverman (2001)	Controllability and generalisability is reduced due to the small sample being used	Silverman (2001) Lee(1991)
Theories from practice can be developed by the researcher	Myers (1997) Benbasat et al. (1987) Yin (2003a)	During summaries, the richness of textual data may be misplaced	Silverman (2001)
The phenomenon is closely and thoroughly described	Silverman (2001)	The collection of data and its analysis may prove to be time	Miles and Huberman(1994) Lee(1991)
The developer, user or researchers may reduce all barriers between them.	Benbasat et al. (1987)	Unbound and unstructured collection of data	Lee(1991)

4.5 Use of Mixed Methods Research

The research reported in this thesis adopts a mixed methodology, where theoretical aspects of the subject of the study are considered in conjunction with practical initiatives and the gathering of data from field studies. This methodology allows the researcher to undertake a comprehensive review of all of the theories associated with the subject, along with the adoption of methodologies for the collection and analysis of empirical, qualitative and quantitative data in a single study. Perhaps the most commonly observed benefit of this type of methodology is that it allows the researcher to cover many dimensions of the subject which could perhaps enable the researcher to understand the topic more clearly and lucidly (Creswell & Plano Clark, 2007).

When a single study includes qualitative as well as quantitative research methods, techniques, approaches, language and concepts it is known as mixed-method research (de Waal, 2001). Mixed research methods are commonly used in the health and social sciences. It is believed that qualitative and quantitative data can be collected, analysed, and mixed within a single study during any stage of the research process when a clear and thorough understanding of the research issue is to be achieved (Tashakkori and Teddlie ,2003; Creswell, 2005). Quantitative or qualitative data are often found to be insufficient when used alone. They need to be used in combination to collect relevant and essential information and to analyse trends, as well as the details of the situation. In conducting such a process, it can be observed that the methods used complement each other and allow an in-depth study of the situation. There are strengths and weaknesses of both types of method which can be managed by using them in combination (Green, Caracelli, and Graham, 1989; Miles and Huberman, 1994; Green and Caracelli, 1997 Tashakkori and Teddlie, 1998).

Researchers are striving to collect thorough data, establish techniques which are useful and conduct a study using appropriate methodologies often make use of this kind of mixed method research. There are disadvantages and advantages with both types of research, and using mixed research as a third paradigm it is possible to manage the gaps that are present (Onwuegbuzie& Leech, 2004a).

Several kinds of information systems in research taxonomies have been introduced due to the different research approaches used in business studies, the natural sciences, sociology and other disciplines (Galliers and Land (1987)). Scholars usually believe that qualitative and quantitative methods must be used in combination, but it is difficult for them to state how these components would integrate or relate to each other (Fidel (2008: 265)). Findings can be integrated and inferences may be drawn from a single research study when the quantitative and qualitative methods are used in an integrated manner (Tashakkori and Creswell (2007)). At times, the researchers make use of multi-methods, which include interviews, observations and surveys (Fidel, 2008). Bernardi et al used three instruments which included a network chart and grid for qualitative and quantitative analyses, a quantitative socio-demographic questionnaire and a qualitative semi-structured interview.

Table 4.2: Strengths and Weaknesses of Mixed Methods Research	
Strengths	**Weaknesses**
1. Meaning can be added to numbers using narrations words and pictures. 2. Precision to pictures, narrations and words can be provided through numbers. 3. Strengths listed in tables 3 and 4 can be reaped when quantitative and qualitative methods are integrated. 4. Grounded theory is generated and tested by the researcher. 5. Since the research is not limited to a single approach, more thorough information can be gathered regarding the research questions. 6. The strengths and weaknesses of the relevant mixed research designs must be analysed for the purpose. For instance, the 2 stage sequential design and the stage 1 results may be used to present information on stage 2. 7. When both methods are used in a single study, it is possible for the researcher to overcome the problems with one method by using the other in its place. 8. The validation of findings and convergence of information would help in presenting a strong and thorough conclusion. 9. Several aspects may be missed when a single method is used. This issue can be overcome by using both at the same time. 10. Results can be generalised to a larger extent using this type of study. 11. A complete and thorough knowledge database for theory and practice is attained for the research study.	1. A single researcher may find it difficult to carry out analysis using both methods which, is why a research team may be required. 2. Knowledge regarding the techniques used in both methods must be present and the researcher must be clearly aware of how the methods are to be applied. 3. Some methodological purists believe that a researcher should either use a qualitative method or quantitative methods. He must not incorporate both. 4. The time needed for a single piece of research may become longer 5. Much more expensive to conduct 6. The research methodologies details of mixed research are yet to be clearly understood. for instance, paradigm mixing issues, the analysis of qualitative or quantitative data and the interpretation of conflicting results.

Some of the advantages of triangulation have been listed by Jick (1979):

A. The researchers become much more confident about their results.
B. Creating techniques of data collection are developed.
C. Thick and rich data are collected.
D. The integration and synthesis of theories are possible.
E. Contradictions may be uncovered.
F. It can work as a litmus test for competing theories since it has a large scope and is comprehensive.

The combination of quantitative and qualitative research has also been encouraged by Sieber (1973) along with the promotion of triangulation carried out by Denzin (1978), Jick (1979). Stages of the research process such as data collection, research design and analysis may all benefit from this combination. For instance, the quantitative data facilitates the qualitative data by presenting the sample members as representative along with the deviant cases in the research design stage. At the same time, the qualitative data can help with the quantitative component by providing conceptual and instrumental development. The quantitative data helps present baseline information and avoids elite bias, that is presenting only high-status individuals, in the data collection stage. During the collection process, the qualitative data helps facilitate the data during the collection stage. In the data analysis stage, the assessment is facilitated by the quantitative data through the generalisation of the qualitative data. The qualitative findings are also emphasised the outputs of the quantitative phase and evaluated based on that. During the data analysis stage the qualitative data, help in clarifying, interpreting, validating and grounding the quantitative results.

Using a single method may be promoted by some researchers, and they may find issues with the application of multiple methods. A complete and thorough understanding of the issue is possible if both methods are integrated into a single study. Results can be validated, compared and triangulated along with presenting a complementary picture. The experiences and process of outcomes are brought forward, and the context of trends are illustrated (Plano Clark, 2010). When the researcher plans to develop a survey instrument, it is usually observed that the quantitative phase follows the qualitative phase and one database is built upon the other. He may also be interested in bringing forward a programme or an intervention. At the same time, if the qualitative phase is carried out after the quantitative phase, the researcher aims to thoroughly explain the quantitative results and bring forward the effective and efficient determinants of the study (Plano Clark, 2010).

Chapters 2 and 3 in this thesis consist of a literature review regarding the adoption of cloud computing and it has been found that, there are several organisational, technological, political and social issues involved in use. The political, organisational, social and technological contexts cannot be separated from challenges and issues involved in the adoption of cloud computing as presented in Chapter 3. Hence, the research approach to be adopted must have the ability to integrate factors that would challenge the scenario. There are several research hypotheses and quantifiable measures of variables that must be considered in a study of cloud computing adoption. Therefore, for the purpose of this study, qualitative research is carried out using interviews and a quantitative study is conducted done with the help of surveys being sent to Saudi government organisations using cloud computing.

4.5.1 Explanatory Design

> *"Explanatory sequential design typically involves two phases: (1) an initial quantitative instrument phase, followed by (2) a qualitative data collection phase, in which the qualitative phase builds directly on the results from the quantitative phase". (Creswell JW, Plano Clark,2011)*

There are two distinct phases which are part of mixed-methods sequential explanatory design. The first phase involves quantitative research and is followed by a qualitative phase in which the researcher collects vital data and analyses numerical or quantitative data. After the numerical data has been analysed, qualitative data are collected and analysed, which helps in explaining or presenting further information about the quantitative data gathered in the first stage (Creswell et al. 2003). In the second phase, it is the qualitative data which are collected after gathering the quantitative data. These two phases are integrated at the final stage of the research. With the help of this approach, it is possible to more thoroughly understand the research issue. The views of participants are analysed in depth through the use of qualitative data, so that the statistical results can be explained in a much more elaborate manner (Rossman and Wilson, 1985; Tashakkori and Teddlie, 1998; Creswell, 2003).

An extensive literature provides debated information regarding the use of mixed methods along with their strengths and weaknesses (Creswell, Goodchild, and Turner, 1996; Green and Caracelli, 1997; Creswell, 2003, 2005; Moghaddam, Walker, and Harre, 2003). Quantitative results can be highlighted further through the presentation of qualitative information. If the quantitative study generates unexpected results, the mixed methods design can prove to be extremely useful (Morse, 1991). However, some of the limitations of this type of design include the length of time it takes to conduct research using both techniques. Also, there exists limited feasibility for collecting and analysing information for each of these techniques.

Three types of concurrent and three sequential designs have been listed by Creswell et al. (2003), which are believed to be the six basic most widely used methods. Researchers usually make use of the mixed-methods sequential explanatory design, since this requires the collection and analysis of quantitative data followed by qualitative data two consecutive phases during a single research study (Tashakkori and Teddlie, 1998; Creswell, 2003, 2005; Creswell et al., 2003). The social and behavioural sciences can also make efficient use of this method (Kinnick and Kempner, 1988; Ceci, 1991; Klassen and Burnaby, 1993; Janz et al., 1996).

The validity and reliability of the results of a study are increased when multiple methods are used in research. This establishes a form of triangulation (Denzin, 1978). Also, it is believed that, with the utilisation of a multi-method research approach, the gaps which are present when using a single approach can be removed. If a researcher is unable to depend on either of the two kinds of research alone, it is advised that multiple methods should be used (Bryman and Bell (2007:649).

4.5.2 Quantitative Phase

In this phase of the present research, a Web-based survey was conducted to collect quantitative data with analysis concerning the potential predictive power of selected variables on the adoption of cloud computing (McMillan, 2000; Creswell, 2005). This survey was developed by the researcher and pilot-tested as it was. Five-point Likert-type scales were used in the survey items to highlight the 19 variables to be measured, as discussed in detail in subsequent.

4.5.3 Qualitative Phase

The multiple case study approach was used in the second, qualitative phase (Yin, 2003). This approach was used to understand the importance of the external and internal factors included in the first stage of the research for cloud computing adoption. A case study is expected to produce rich data in content from various reliable sources over a certain period (Merriam, 1998). The second phase of qualitative data collection was carried out to provide further insights regarding the research questions and to help in explaining of the analysis of qualitative data. Full details are given in subsequent sections.

4.6 Adoption of the Survey Method

In applied social research, the survey is considered to be an essential measurement approach (Pinsonneault and Kraemer, 1993). When quantitative statistics is to be used in the analysis, the survey method is often used. It is a systematic method which helps gather information relating to a sample of the population. This information would provide the rationale of constructing quantitative attributes. A population is a large group of people and with the help of a survey; it is possible to collect information regarding the actions, characteristics or opinions of these people.

There are 3 distinct characteristics of a survey. It can provide quantitative descriptions of specific aspects of the population at hand. The analysis of the data may be able to discover relationships between variables or then would be able to present findings upon a predefined population. Survey research is part of a process of quantitative analysis which can present standardised information about the population or sample being studied. This sample may be in the form of organisations, groups, individuals, communities, systems, applications or projects.

There are two common methods used in MIS and by comparing the survey techniques used in these methods; it is possible to present a complete understanding. The MIS methods are the laboratory experiments and the case studies. A case study involves a phenomena examined in its natural setting. The scope and time of the analysis are only controlled by the researcher and he has no control over the phenomena as a whole. Independent or dependent variables may not be clearly defined by the researcher. When the context and phenomena of interest are to be integrated and studied, the case study method proves to be extremely efficient.

A wide variety of natural settings can be included in the case study. There are specific and expected relationships present amongst the variables of the observations in the particular model. It is considered appropriate to use the survey research in the following circumstances:

A. When the phenomenon requires answers to a 'what is happening' question. It may also be able to find answers for how is it happening, why is it happening, how much, how many and many other what, why and how questions.
B. It is not desirable or possible to control the dependent and independent variables.
C. The phenomena of interest must be present in its natural setting.
D. The phenomena of interest in the recent past or current period should be taken into account.

Identifying concepts to be measured and how they will be measured is carried out using the exploratory survey. New dimensions, opportunities or possibilities may develop for the population of interest when the exploratory survey is used. Several kinds of end-user computing being conducted in organisation were surveyed.

Theory can be tested and relationships between variables are analysed using a survey research. The in-depth analysis is conducted to understand the theoretically grounded expectations regarding the present variables. A cause and effect element is present within the theory where it is believed that there is a relationship present between variables. However, it also assumes that there is a directionality in which the relationships between variables have a proper direction; for instance, if the relationship is positive or negative or that variable A has the ability to influence variable B. The presence of causal relationships may not only be identified but explanatory questions also aim to understand why the relationship is present. Hence, a central question of this type of survey is whether or not a hypothesised causal link exists and if it exists for defined reasons.

4.7 Adoption of Case Study Method

> *"An empirical inquiry that investigates a contemporary phenomenon within its real-life context; especially when the boundaries between phenomenon and context are not clearly evident"* (Yin 2003).

When a detailed understanding of the organisational or social processes is to be achieved, the case study method is often used. It helps to obtain a thorough understanding of how and why questions which is why the information systems commonly use the method. Rich data can be collected regarding relevant topics when this approach is applied (Orlikowski and Baroudi, 1991; Ghauri and Gronhaug, 2010). Several data collection techniques are used to gather information relating to a wide variety of factors (Creswell, 2009).

For case studies especially, there is some set of methodological researches established by some management information systems (MIS) experts. These researches are highly based on the rules of qualitative research. According to (Benbasat 1987) and (Dubé & Paré 2003), the purpose of case studies is to efficiently explain the place of case research subject where it can be best suited in the system of knowledge generation. This is also a source of detailed knowledge for data collection and help in the selection of case study.

The case study appeared to be the most suitable approach for conducting research into the factors which have a direct influence in the adoption of cloud computing by governmental organisations. This is mainly because of the methodological and philosophical points which have already been explained in the previous sections. This approach is very well suited for research into Information systems and the scope of the present research which is based mainly on organisational factors rather than technical concerns (Benbasat, 1987; Irani et al., 1999; Orlikowski & Baroudi, 1991). This method has been used by many researchers for many years for different topics (Myers & Avison, 2002), and is extensively used by social scientists to explain novel situations arising in day to day life.

The case study approach can accommodate a number of methods and processes which can be altered according to the situation and circumstances (Denscombe, 2007) . (Yin, 2003) is of the view that for theoretical topics, case study is a best-suited approach as it provides tremendous quantity of knowledge about the topic. According to (Yin, 2003), through the case study those areas can be deliberately chosen about which we have to gain knowledge to understand much more about the topic which might not be available in form of numbers or data points.

According to (Cavaye, 1996), a case study can assist the researcher in gaining insight into the situation and can also help in arranging the observations made during the research. There are two ways in which this method can be applied using interpretivist and positivist methods (Stake, 2000). Number of disciplines can be added to this approach as it provides a variety of versions. (Benbasat, 1987) and (Yin, 1994) stated that through the case study data can be collected from one or more sources including many organisations. Furthermore, a situation can be analysed in its natural setting. Sources of data can be written materials, questionnaires, observations and interviews.

Scenarios about which not much theoretical material is available can be best dealt with using the case study approach. Various theories can be formulated based on original and natural setting of the phenomenon. For the purpose of this research, the case study approach has been chosen as the methodology applied. It helps analyse the single phenomenon which is selected from a particular department, organisation, information system or any other (Oates ,2009). The organisations can make efficient use of this method as it helps study relevant and vital information system development and implements it effectively (Darke, Shanks and Broadbent ,1998).

4.7.1 Selection of Multiple Case Studies

A researcher could take only a single case to support his points and ideas about the phenomenon. A single case study has various advantages and disadvantages. It enables vast and rich description of the primary data required, it becomes easy to analyse fully and identify the structure of the phenomenon (Irani et al., 1999). However, the use of a single case risks misjudging the phenomenon of interest, and there is a reduction in the solid points for giving a conclusion single case study would give one or two perspectives which will be exaggerated through the research, making it less impactful (Lee, 1991). A multiple case study enables different contexts to be studied and compared, allowing a larger study to be informed and conduction of different analysis among these studies can be observed (Voss et al., 2002). The adverse points of multiple case study is that it has so much in store to share that the depth of each and every point cannot be studied and researched. It guards against potential research bias. Working with either of the case studies would have its own advantages and disadvantages, depending on the type of phenomenon being researched.

The purpose of applying this method in the present research is to analyse the IS phenomenon thoroughly. The context of this phenomenon, its investigation, along with the theories of practice is to be analysed. There are complex relationships present between factors within this phenomenon and for this understanding the why and how questions are answered by the case study method. There are some researches where empirical information is not sufficient in literature which is why it is possible to apply this tool for such research studies (Benbasat et al., 1987).

For the provision of a conceptual framework of cloud computing adoption, we need to adopt the multiple case study approach. This thesis requires this kind of approach to suit the research context. Using a single case study here would not provide enough information. Using multiple cases helps to internally validate and cross-check findings through conducting a comparative analysis of the case findings (Yin, 2003). The generalisability of the findings can also be enhanced by using multiple case studies. During any kind of research, it has been witnessed that case study research method is the most useful, common and qualitative research method used in information systems researchers (Orlikowski & Baroudi, 1991; Alavi & Carlson, 1992). The study has been immensely supported by the information systems literature. (Stuart et al., 2002) suggested that one to three cases may be sufficient. The point of argument was guiding principles that have more effect on the reduction of returns rather than the expansion beyond a number of cases. Selecting which and how much field work is required to make the research useful is certainly a difficult task regarding case study research.

Concerning of the adoption of cloud computing only the multiple case study approach can help to depict and provide useful results. The characteristics of this research help us to decide that a multiple case study would be useful in this context as it is an adopted as a joint concern in Saudi Arabia. The analysis of data from many organisations is possible with this strategy. The involvement of stakeholders can prove to be beneficial. As a case study employed within the public sector, including the stakeholders having excess data proved to be a successful effort as the proposed method was connected with case study (Cloud computing adoption in Saudi) at a national level to understand the adoption of Cloud computing and how can be affected. Multiple case studies can give powerful and robust results as compared to a single case study. This approach would help in all matters concerned.

As discussed above, involvement of the stakeholders in the research is one of the most different and useful characteristics of multiple case study. The participants in this research work in government military and civilian organisations located in the Kingdom of Saudi Arabia. All the data collected this way would give away to various approaches and resources proving beneficial for the research.

4.8 Research Strategy

Various research methods have been applied in this study, which allows a triangulation approach to be used. The multi-method approach to data collection has been facilitated by dividing the research strategy into two main divisions. A questionnaire-based survey is used to collect quantitative data, and in the second phase, the qualitative data is collected using interviews with employees.

4.9 Phase 1: Quantitative Strategy: Using Survey

The questionnaire-based survey approach is used to collect data regarding the studies problem. This discusses the questionnaire development, pilot study, translation of the questionnaire, the survey protocol, and data analysis methods.

4.9.1 Questionnaire Development

The survey was used to collect data on the factors which may have an effect on the adoption of cloud computing. Literature is already present upon cloud computing adoption which has been used for the design of the questionnaire. Several other similar studies present in the literature have also been used to form the 56 questions part of this questionnaire (see Appendix A).

Clear and brief instructions were provided to the respondents to make sure that responses could be given easily and entirely completed in an acceptable manner. The nature of the research study was explained to the respondents using a covering letter provided along with the questionnaire. Respondents were instructed not to write their name on the questionnaires so that their identities would not be known. They were also assured that the information they gave would remain confidential. Leading organisations in Saudi Arabia were chosen and copies of the questionnaire were sent to them. Several other independent entities also received the questionnaire in order to be participated.

The main instruments used in the web-based questionnaire were dichotomous questions and those using a five-point Likert scale. Demographic information about respondents was also obtained, and the questionnaire was divided into various sections. 34 closed format questions were included (see Appendices B and C) and 190 questionnaires were distributed, out of which 169 responses were received.

In the modern world, the use of personal computers has become a core necessity for individuals. The Internet has created a new range of opportunities for survey research to be conducted. Hence, it is believed that electronic surveys may be one of the most appropriate methods for survey activities (Dillman, 2000). Web-based surveys are extremely flexible and inexpensive, which is why they are becoming a popular form of electronic survey. Various graphics and typographical elements can be included in the questionnaire design. Links terms may also be provided for respondents to use if they wish to view definitions of words or to clarify instructions. Pull-down menus can also be incorporated into sets of response choices. The results can be reported in an immediate manner and can be directly sent to the researcher's database so that there is a limited availability for any errors.

4.9.2 Survey Pilot Test

A thorough survey design must consist of a pilot study. This does not guarantee complete success in the main study, but it does provide some level of satisfaction. The pilot study represents a study of the feasibility of the main study. A trial run or small-scale study is carried out by conducting the large-scale research (Polit et al., 2001: 467), and this is a means of pre-testing the suitability of the specific research instrument to be used (Baker 1994: 182-3).

The results of a pilot study provide with warning of potential mistakes or weakness in the research methodology or tools of collecting the data. Specific issues may be highlighted and there may even be a possibility that the main project would fail. It also states which research protocols should be followed; the instruments to be used and the methods to be applied for a successful research project. Believe that pilot tests must be run first, and the risks should not be taken (De Vaus (1993: 54)). Other reasons for conducting pilot studies include the satisfaction of the funding agencies. These organisations need a thorough report showing that the main research project would be likely to succeed, and the pilot study may help them to answer several concerns. Other reasons for conducting pilot studies include the following:

1: Research instrument testing is carried out, and their adequacy is confirmed.
2: The research protocol is designed.
3: The feasibility of the main or full-scale study is answered.
4: Whether or not the research protocol is analysed realistic and workable.
5: The success of the proposed recruitment approach is assessed.
6: The effectiveness of the sampling frame and techniques used are checked.
7: Logical issues which may arise when using the proposed methods are checked.
8: Sample size is determined when the variability of outcomes has been estimated.
9: Preliminary data are collected.
10: Resources needed in the planned study, such as staff and finance, are determined.
11: The proposed methods of data analysis are assessed to uncover potential problems.
12: The research plan and research questions are developed.

The pilot study in the present research was conducted after the questionnaire had been designed. It made use of five participants and had two main aims. The first aim to improve the quality of questions, and the second was to test the comprehension of the respondents as well as provide clarity to the actual administered survey (Saunders et al., 2003; Miles and Huberman, 1994).

4.9.3 Questionnaire Translation

The questionnaire was prepared in the Arabic language. The instructions for the survey were clear and comprehensive. The translation of the questionnaire must also be done in an efficient manner. The questions formed must be clear, and all respondents must interpret them as having the same meaning. Hence, the following aspects must be considered when a questionnaire is translated (Usunier, 1998):

1: Lexical meaning – precise meanings of individual words must be stated.
2: Idiomatic meaning –words with meanings which are natural to the native speaker must be used and it should not be deducted from the individual words.
3: Experimental meaning –words and sentences used by individuals in their everyday lives must have equivalence.
4: Grammar and syntax –use of language must be appropriate should form proper sentences with the correct order of words and phrases.

The questionnaire may be translated using several techniques (Usunier, 1998), and their advantages and disadvantages are shown in Table 4.3.

Table 4.3: Translation techniques for questionnaires

	Direct translation	Back-translation	Parallel translation	Mixed techniques
Approach	Source to target questionnaire	Source to target, then back to source questionnaire. Comparing both source questionnaires. Final version to be established.	Source to target questionnaire using two or more independent translators. The two target questionnaires to be compared. Final version to be established.	Two or more independent translators to carry out back translation. The two new questionnaires to be compared. Final version to be established.
Advantages	Relatively inexpensive and easy to implement	Most issues are expected to be noticed.	The target questionnaire is effectively written in good words.	The source and target questionnaires are better matched.
Disadvantages	Several discrepancies may arise, including the meaning related when source and target questionnaires are both used.	A native speaker of the source language and a native speaker of the target language are both required.	The target questionnaire must not include idiomatic, lexical and experiential meanings.	Two or more independent translators are required, which may be costly. The source questionnaire cannot be changed.

Source: Adapted from (Usunier,1998)

When the questionnaire is translated, it is essential that proper care is taken. The questions must be translated, decoded and answered in a specific and required manner for the research (Saunders et al., (2003: 300)). The English language was used to develop the original questionnaire (see Appendix B), and it was then translated into Arabic (see Appendix C). This was done to help those respondents who did not understand the English language or speak it as their mother tongue.

The direct translation method was used, where fluency, accuracy and term use facility were incorporated in order to make sure the translation was efficient. Misconstrued meanings of the answers and misunderstandings would otherwise occur if the translation were inaccurate, and the entire data collection process would be vastly affected (Saunders et al., 2003).

4.9.4 Survey Protocol

The questionnaire was prepared and then uploaded to the internet for a trial run with selected individuals who were then invited to provide their comments. Participants were provided with a demonstration of the completion of the questionnaire.

A number of criteria were set for the participants, which included:

- They had to have extensive experience of working in government departments.
- They had to be either working or had spent time working, for a government department.
- Senior management in government departments were targeted.
- Preference was given to IT managers in government organisations.
- IT consultants who had experience of working with government organisations were also included.
- Mid-level IT department employees in government organisations included among the respondents.
- Teachers and instructors interacting with government organisations and employees were also included.

The questionnaire is intended to offer a brief explanation and summary on the importance of research for government departments, with there being no amount or coercion or there being no attempt to influence the results in any way whatsoever.

The questionnaire was designed and distributed in the Arabic language to a sample of 190 respondents. Of these, 169 completed responses were received, which formed the basis of the subsequent analysis.

4.9.5 Quantitative: Data Analysis Methods

A number of statistical tools and methodologies can be employed in analysing quantitative data, including tools such as SPSS, odds ratios, Fisher's exact and Pearson chi-square tests (Cody and Smith, 1991; Rudas, 1998). The relationships evident between the multiple answers to the questionnaire are often of greater focus to the quantitative analysis researcher, compared to the specific answers themselves. Perhaps, this forms the basis of the "odd rations" (Rudas, 1998) which directly measures the correlation between questionnaire answers (Rudas, 1998). Beginning with a table compiling the unprocessed frequencies, the researcher may subsequently convert these for comparison using an odds ratio table, with the ratios not being calculable if multiple cells are between zero and five (Rudas, 1998).

Responses to questions requiring specific numeric answers were compiled electronically while descriptive answers were separately grouped and arranged for in-depth study. This was conducted using a coding scheme. Saunders, Lewis and Thornhill (2009) stated that this makes it easy to compare answers against other similar subsets. An example of the data coding used is included in Appendix D, where the results are summarised and presented in percentiles. A summary of the results obtained from the questionnaire survey is presented in chapter 7.

A descriptive statistics were employed to generate averages, central tendencies, distributions and measures normality of the data represented in either tabular or graphical form. The following sections explain the parameters utilised in the research, respondents have acknowledged the questionnaire, exhibiting the general trends against parallel subsets of answers received towards an initial analysis of the data before subjecting it to a more rigorous examination.

The survey was conducted with a sample of employees of various government organisations in Saudi Arabia. The analysis of the data obtained using the survey involved two key processes. The first process involved the tabulation of the quantitative data using Microsoft Excel. The second process consisted of the coding of the quantitative responses which were then statistically analysed using SPSS. The analysis plan highlighted the primary research questions in deference to the questionnaire items whereby nineteen variables were classified as key variables and therefore it was important to conduct a cross-tabulation of between these variables and the adoption of cloud computing to establish the deviation in responses. The quantitative analysis of the data were extended from descriptive and one-way frequency statistics to inferential and regression analysis.

4.10 Phase 2: Qualitative Strategy: Case Study Method

The appropriate type of the case study for this research, is classified by Yin (1993) as an explanatory case study. The primary intention is to understand and explain the prevailing way of execution, and the present day issues and challenges. Multiple factors, including the requirement for detailed analysis requiring a large population, normal conditions, the complexity and a host of factors has made researchers more inclined towards qualitative methodologies instead of quantitative tactics (Benbasat et al. 1987). This facilitates the researcher towards conveniently undertaking a research exercise where it would be easier to initially observe and conclude upon the currently observed situational parameters and later delve deeper into the issues and challenges so observed to understand the dynamics of the observations made initially (GilIham, 2003).

The qualitative research methodology suggested by Walsham (1995a) was employed to undertake an investigation of the sample of government employees selected in this part of the study. A number of methodologies were employed, including in-depth semi-structured interviews using an interview guide. This conceptual model and the supporting literature all went towards providing the basis for formulating the questions enquired from respondents during the interview. The interviews were designed to cover aspects related the adoption of cloud computing, the relevant issues perceived in the process and how the associated problems and challenges could be rectified in the Saudi environment (see Appendix E). Once the interview guide was given final shape, the researchers proceeded to identify people from multiple cadres who were approached for questioning in government organisations. A sample of sixteen interviewees was selected (see Table 4.4), who had varying technical and managerial backgrounds.

Table 4.4: Characteristics of Interviewees

	Organisation Name	Type	No. Participants	No. Respondents
1	Government Organisation	Public sector	4	Senior Manager = 1 IT Manager = 1 IT Specialist = 2
2	Government Organisation	Public sector – Military organisation	4	Senior Manager = 1 IT Manager = 1 IT Specialist = 2
3	Government Organisation	Public sector – Military organisation	4	Senior Manager = 1 IT Manager = 1 IT Specialist = 2
4	Government Organisation	Public Sector	4	Senior Manager = 1 IT Manager = 1 IT Specialist = 2

4.10.1 Interview Method

According to (Yin 2003), " the interview is the most vital source for generating case study information", and can generate information in qualitative research most effectively (Oates

2006). Yin added that interviews can also serve as a means of instantly providing past information about the scenario. Moreover, the interview can also point to other relevant sources that can be helpful for the researcher. That a great number of case studies are relevant to human affairs which should be reported and inferred by the human version of events diminishes the existence of certain biases of interview such as poor recall, and inaccurate articulation. Interviews play a crucial role in qualitative research (Oates, 2006), and also Yin (2003) stated "one of the most important sources of case study information is the interview". Hence, even if interviews maybe subject to underlying challenges and issues related to the bias of the interviewer and the interviewee, an inability to recall specifics or being unable to properly articulate them, they are nevertheless an essential component of the research since they provide the human input and element. Interviews can provide detailed information and indications of extraneous factors affecting the final outcomes.

The interviews were conducted with a cross-section of the people involved with various aspects of cloud computing in the Saudi's government organisations. The interviews provided first-hand perspectives on the challenges inherent in the issue. Yin (2003a) stated that the reliability of interviewers could be perhaps doubted as per earlier factors detailed, especially if the pool of interviewees is eight or less in a qualitative research exercise (Stake, 1995; Lam, 2005). Therefore a sample of 16 candidates was selected to reduce interviewee bias. Furthermore, the responses received were triangulated to draw the most likely standardised answers and further reduce significant variations in the result.

Yin (2003a) also recommended the inclusion of variation in the conduct of interviews, and suggested that a combination of open-ended, focused and structured questions be asked of subjects. While structured interviews would be more concerned with specific questions on specific topics, more open-ended questions would allow for the interviewee to provide varied input. Correspondingly, focused semi-structured questioning would go towards eliciting responses on a specific aspect of the subject under consideration. The majority of questions in the interviews in this study were focused questions, but other forms of questions were used too.

> *"Semi-structured interviews are designed to have a number of interviewer questions prepared in advance, but such prepared questions are designed to be sufficiently open that the subsequent questions of the interviewer cannot be planned in advance but must be improvised in a careful and theorized way" (Wengraf, 2001: 5).*

A primary advantage of using the semi-structured interview design is that it offers a greater chance of extracting the information required. Depending on the interviewer's perception of the answers received, the questioning can be made more detailed, or can focus on other areas, which would be difficult with a pre-set list of a structured questionnaire. Therefore, a semi-structured interview allows the interviewer to probe the issues in more while also ensuring that the primary focus of the discussion remains within agreed upon boundaries. The interview guide structured on the information gained during the data collection process and to the information gleaned while setting the parameters for the research was much more helpful.

4.10.2 Pilot Test - Case Study

The data collection process was mapped by utilizing the interview guide, in conjunction and association with the research questionnaire distributed amongst the target sample. This guide was formulated after conducting two pilot interview sessions at two different government organisations with people from varying backgrounds in these institutions. This was much more helpful in drawing up the final version of the interview guide.

Two specific individuals were targeted during the pilot interview sessions, from different managerial level and organisation. This enabled the researcher to test out the questions drawn up, and also to determine the duration of the interviews. Varied topics were covered during the interview process, including aspects of cloud computing in general, its background in the Saudi Arabian context, its current prevalence in the relevant sector, the expectations of the community involved, and the problems and challenges faced implementing the process on the organisational level. The pilot interviews led to the identification of the following issues:

1: There was a tendency for people to share their personal experiences when answering questions.
2: A few respondents enquired about the purpose of the entire research exercise.
3: An hour's time was usually sufficient for the whole interview.
4: At times, interviewees were unclear on the asked enquired, necessitating rephrasing.
5: All of the sessions were recorded for later reference.

The above process enabled the researcher to make the necessary amendments to the questions and format so that the maximum information possible was obtained during the interviews. Furthermore, while Arabic remained the main communication language, for the majority of the respondents were more comfortable with this language. A few of the technical terms were still explained in English for the Arabic vocabulary was sometimes deemed insufficient for them.

4.10.3 Case Study Validity

A set of the questions was provided to the interviewees in advance so that they could formulate their answers more appropriately. An interview guide was utilised, which is enclosed in Appendix 1 to this document. The interviewer also took care to ensure that the questions were compatible to the cadre of the employee being interviewed, so that everyone was not asked the same set of questions. However, uniform thread to the line of questioning was maintained so that no major bias crept into the questioning.

A few open-ended questions were also included, so that the interviewers could express their views and perceptions openly, which at times also generated a few unplanned and spontaneous questions from the interviewer. That is important to ensure that the entire process was valid and transparent. Every interview session was audio-recorded, with the audio tape later shared with the interviewee so that they would be aware of what they had disclosed during the process (Iraniet awl., 2005). During the entire exercise, great efforts were made by the researcher to ensure that the integrity of the data sources was properly maintained (Jick, 1979; Iraniet al., 2005).

4.10.4 The Interview Procedure

The interviews were conducted in a cross-section of Saudi Arabian government organisations, between October 2013 and January 2014. The process was primarily intended to cast additional light on the issue of cloud computing in the light of the literature available on this topic, and was also intended to identify the factors affecting cloud computing options in the public sector. When the list of questions was circulated amongst the participating respondents, it agreed that the personal details of the respondents would not be shared publicly. Furthermore, to ensure that the participants were not compromised, no information on government organisations and participant's information would be disclosed in the final publication of the research in the relevant journals. So, if personal or professional details about a respondent were revealed in the text of the interview, this information was redacted during editing in order to ensure complete anonymity for the interviews. On approaching each of the respondents in person, the following details were initially given:

- The researcher introduced himself, and explained his professional capacity.
- The objectives of the study were discussed.

- The interviewee was informed of the likely duration of the interview so that he could manage his time accordingly, in addition to the requirement to complete a questionnaire, and the timeline of the entire study were conveyed.
- The interviewee was assured that his identity would not be disclosed, and that his participation in the research would remain confidential.
- The interviewee was urged to provide his responses to the questionnaire before the interview took place.
- The national importance of the study was impressed upon the subjects.

The duration of the interviews was observed to be around one hour, with each session being conducted individually. The sessions were detailed and yielded significant data for the study, to the extent that data saturation was also observed since, after the sixth interview, the information being obtained was observed to be repetitive.

All of the interview sessions were conducted personally by the researcher, so that there was minimal distortion in the presentation of the facts, and all the facts were conveniently communicated by both the interviewer and the interviewee during the exercise. The sessions were conducted in private, either in designated meeting rooms or in a respondent's official premises such as the overall atmosphere being calm and composed. Of course, considering that it was an official environment and the candidates had other engagements in parallel, minor disruptions such as incoming phone calls occurred but overall this problem was negligible. At times, follow-up sessions were also required, and these accordingly arranged.

4.10.5 Writing up the Interviews

Interviews were conducted in Arabic and were electronically recorded for later reference. The interviewer also wrote up a summary of the recording, and shared this with the interviewee within around 15 days of the session, so that the interviewee could personally review and go through the questions asked and his responses. Although this required sizeable investments of time and effort on the interviewer's part, it meant that a level of trust developed between the participants, and it offered an opportunity to clarify further on any aspect where required.

Although personal and individual interviews do provide detailed and thorough information, they require considerable investments of personal time and effort considering that this is a slow and tedious exercise. However, in this case, the entire exercise was conducted thoroughly and the process was only concluded when the researcher was satisfied with quality of the information received, following the advice of Hartley (1994) that you only “leave when you have enough data".

The next table shows the list of interview questions:

Table 4.5: list of interview questions

Context	Factor	Questions	Purpose
General	Cloud Adoption	1. Do you support the adoption of cloud computing in your organisation, why and how? 2. What are the expected challenges you think it will face your organisation when you adopting the cloud computing in the near future, and how do you think you can overcome them?	• To understand the readiness of government organisation from the perspective of the key persons to adopt the cloud computing. • To study the reasons and motivations of adopting the cloud computing from their perspective. • To understand the role of the key persons in the process of adopting the cloud computing. • To study the challenges of the adopting the cloud computing and recommendations to solve them.

Organisational and Technological Context	Service Quality	1. Do you think the service quality of the cloud computing will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	• To study whether the factor important or not. • To find out how important is. • To find out the solutions, suggestions, ideas on how to avoid any challenges about this factor. • To get a deep understanding about this factor from the point view of the key persons in the government organisations.
	Usefulness	1. Do you think the usefulness of the cloud computing will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Security concerns	1. Do you think the security concerns of the cloud computing will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	

	Complexity	1. Do you think the complexity of the cloud computing technology will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Cost	1. Do you think the cost of the cloud computing services will be an important factor that would effect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Organisational size	1. Do you think the organisational size will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	IT infrastructure	1. Do you think the IT infrastructure readiness of the cloud computing technology will be an important factor that would affect your decision of adopting the cloud computing in your organisation, and how important is, could you freely	

		talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Feasibility	1. Do you think it will be feasible to adopt cloud computing technology and the feasibility will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Trust	1. Do you think the trust of the cloud computing technology will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Organisational culture	1. Do you think the organisational culture will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists?	

		4. Any other ideas or suggestions in this regard, please?	
	Organisational structure	1. Do you think the organisational structure will be an important factor that would affect your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Privacy risks	1. Do you think the privacy risks of the cloud computing technology will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
Environmental and External Pressures	Government support	1. Do you think the government support will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	

	Regulatory concerns	1. Do you think the regulatory concerns will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	External pressures	1. Do you think the external pressures will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Culture	1. Do you think the culture will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	

Perceived Benefits	Direct benefits	1. Do you think the direct benefits will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	
	Indirect benefits	1. Do you think the indirect benefits will be an important factor that would affect on your decision of adopting the cloud computing in your organisation, and how important is, could you freely talk about it, please? 2. How will it affect, negatively or positively, explain, please? 3. How do think will be the solutions to overcome any negative effect if exists? 4. Any other ideas or suggestions in this regard, please?	

4.10.6 Qualitative Data Analysis Techniques

Data analysis usually concludes the empirical research process, with the data collected analysed to provide conclusions. Considering that the major part of the data gained through the process is usually qualitative, there is normally no set and defined rules governing the analysis of the process (Lubbe, 2003) and therefore the paths towards deriving results would entail myriad ways, none of them mathematical or robotic in nature. Bogdan and Biklen (2003) stated that the analysis of qualitative data involves a lengthy and at times meandering trial and error process, tabulating the observations, compartmentalizing and breaking down the observations, looking into the data for specific patterns and deciding on what is of relevance to the study at hand and discarding the rest of the information gleaned in the process. Since an interview with a human being is the primary data collection process here, subtle hints dropped by the interviewee are more often of more value than the words expressed. Hence, for the purpose of this research, each of the words electronically records was correlated by the researcher to the overall broader framework under consideration, keeping in perspective the extraneous factors observed during the process and all were aligned to conclude the process.

To Yin (2003a) data analysis involves many processes of examining, categorising, tabulating and recombining the data towards deriving the results so desired from the input made. To Denscombe (2007), analysis means convert unprocessed information into manageable components for which the researcher has to make considerable efforts and input towards linking up the available information with the desired results. Therefore, the analysis is the effort to understand underlying information being communicated by the visible data available to the researcher. Going and working backwards to the source of the information available, the researcher aims to formulate and agree upon certain general principles observed during the study which could be applied and dubbed upon in similar and corresponding situations elsewhere.

Hartley (1994) stated that data collection and analysis support and complement each other, which together contributes towards the links for ultimately developing a theory. Hence, before we go into the specifics of the precise and actual analysis processes employed for the purpose of this study, the same is being summarised and an overview of the process presented. Any particular process ultimately chosen, employed and worked upon by the researcher was all towards successfully drawing the required results. Towards this end, Yin (2003a) recommends a two-pronged approach of either being dependent on theoretical propositions and ideas or else working with a case study approach. Of the two, researchers normally choose theoretical propositions in the first instance since the majority of case study approaches all draw their basic ideas and concepts from them which go towards contributing recommendations and ideas for the questionnaires and the methodologies to be employed.

Drawing up a case study requires creating the entire framework and laying out the specifics of the whole strategy to be followed for the purpose of the research. While this methodology is more labour intensive, it is also more practical in situations where the theoretical propositions alone are insufficient to enable the researcher to proceed and initiate the work cycle (Yin, 2003a). This research project relied more on theoretical propositions to initiate the strategy, which allowed for the exclusion and deletion of certain processes the very beginning, without affecting the quality of the research summarised in the conclusion. Once the general strategy for the entire strategy is agreed upon, it is then imperative on the researcher to sort and select on the specific processes and procedures they would be taken to conclude the multiple stages of the research, considering that "the analysis of case study evidence is one of the least developed and most difficult aspects of doing a case study" (Yin, 2003a:109).

Yin (2009) claims that while statistical and mathematical tools like Atlas and NVivo do provide a certain degree in finalizing and formulating the results of empirical research, but ultimately they can only be effective to a certain extent, and researchers should try to ensure that they are not totally and completely dependent on such tools as a replacement for the human interaction aspect.

For the purpose of this study, the NVivo computerized application was taken in conjunction with the human interviewers, with the analysis of the data following a thematic process involving encoding the information obtained from the interviews and the questionnaire towards identifying common threads (Boyatzis, 1998). (Kelle, 1995) stated that computer-aided research models can enhance the quality of the output obtained from empirical research to a certain extent, particularly in the two dimensions of assisting in handling high volumes of raw data and later with assigning corresponding codes to it, as well as assisting in the effective retrieval of the required information at a later date. This goes to ensure validity of the qualitative research data and helps towards proving that the results are concluded with genuine information and corresponding trends observed, instead of being based on some random occurrence.

The methods of data analysis employed in this study included:

- The major and core patterns of the data were identified by the utilization of the interview framework and the corresponding guide, with the researcher taking the time, and making the effort to read through all the raw data towards having a complete understanding of what is available on hand.
- Subsequently, data was coded so that duplications could be get rid of (Miles and Huberman, 1994). To this end, the row data are quoted in this thesis wherever required so that would be assisted on the qualitative insight aspect, and it would also help in interpreting the information summarised (Paton and Paton, 1990).
- The final aspect of the analysis involved the proper order of the researcher's thought process so that the results derived are focused and conclusive. Thus, a formal process was initiated to bring coherence and continuity to the researcher's jottings and notes so that the reader of the report is able to correctly perceive whatever has been summarized through all the efforts spent in the study (Gibbs, 2002and Miles and Huberman, 1994).

Thus, various analytical techniques and processes have been utilised, to summarise, the information, including classifying and categorizing the data, drawing conclusions, and reviewing and checking the consistency of the information compiled. The initial model was always adhered to, although minor variations were allowed to accommodate improvements in it whenever perceived so. Crabtree and Miller introduced the concept of template analysis in the United States in the early 1990s, which was propagated and made common in the UK through the efforts of Nigel King (King and Horrocks, 2010)

Template analysis identifies key trends of the text in the data and brings out common themes and the corresponding prior codes. The codes help in structuring the data and allow the researcher to concentrate on the relevant studies relevant to the research (Crabtree and Miller, 1999; King, 2004; King and Horrocks, 2010). Waring and Wainwright (2008) state that template analysis is suitable for the analysis of qualitative data in research into organisational behaviour. Template analysis is flexible, which goes to enable the researcher towards customizing the process as per the specific requirements and individual parameters (King and Horrocks, 2010). Waring and Wainwright (2008) summarized the methodology used this type of analysis as follows:

1. Creation of a code
2. The code used to convert the text, either electronically or manually.
3. Arranging for similar texts to be grouped together.
4. Reading through the entire scattered segments and synchronizing them to provide meaning.

This is the main themes are described in the literature:

1. Technology-related factors
2. Organisation-related factors
3. Environment-related factors

In conclusion, all the interviews have been recorded electronically and transcribed as well. Nvivo software tool has been utilised to support the qualitative analysis process of the data collected. The nodes have been also created to analysing the data collected in order to reflect the factors identified in the conceptual framework. Coding has been done by reviewing and reading the interview transcripts that have been conducted. All answers have been associated and mapped to a particular question, and then compared to other respondents' answers. The interview questions have been designed and developed based on the conceptual framework of this study. All data gathered throughout the interview process have been observed where it would go into the proposed framework.

4.10.7 The Prior Codes for the Qualitative Study

It is crucial to identify prior codes and themes in order to interpret and describe the data of the case studies. The purpose of these codes is to mark the segments of data with category descriptions, descriptive words, or symbols. They are selected based on the research questions and relevant studies which discussed in chapter 2 and 3. Therefore, a set of themes and codes have been identified as shown in Table 4.5.

Table 4.5: Prior Codes

Themes	**Organisational and Technological**	**Environmental and External Pressures**	**Perceived Benefits**
Codes	Service quality Usefulness Security concerns Complexity Cost Organisational size IT infrastructure readiness Feasibility Trust Organisational Culture Organisational structure Privacy risks	Government support Regulatory concerns External pressures Culture Industry type	Direct benefits Indirect benefits

4.11 Ethical Considerations

Throughout the execution of this project, efforts were made to adhere to ethical considerations to at all times to protect the participants from any adverse effects from the inputs provided by them. Major concerns included privacy deception, anonymity, accuracy and confidentiality (Neuman, 2000; Rogerson, 2007) which were taken into account at all times. Sapsford and Jupp (2006:293) stated that professionalism requires that research ethics be adhered to, and these were handled in line with the standards set by Rogerson (2007) and Sapsford and Jupp (2006:293) in the following ways: (1) ensuring the consent of the respondents; (2) clearly explaining the research parameters before respondents began their participation; (3) assuring participants of their anonymity and privacy; (4) if at any time during the research, a respondent felt uncomfortable, he was at liberty to withdraw; (5) review notes were provided to the respondents, and if a participant then decided he would prefer not to have his input included in the study, the individual was allowed complete freedom to withdraw; (6) the interviews were conducted in enclosed spaces and so the privacy of the participants was ensured, and all electronic and physical copies of material related to the survey were made secure against all kinds of unauthorized access; (7) interview notes were only retained in the researcher's laptop further limiting unauthorized access; (8) the interviewer worked very professionally to ensure that the goodwill of the organisations involved was not harmed in any way.

4.12 Chapter Summary

This chapter discussed and presented the research methods have been adopted for this study. The using of the mixed-method approach also has been explained. In addition, the chapter discussed the design of the survey that has been used. Also, this chapter explained the use of the multiple case studies. The method of this study is divided into two phases as described in this chapter as well. The entire pilot testing has been discussed.

5 SURVEY RESEARCH FINDINGS

5.1 Introduction

The survey was conducted between August 2013 and September 2013, whereby a sample was selected from the employees of various organisations. The analysis of the data obtained from survey involved two key processes. The first process involved the tabulation of the quantitative survey data using Microsoft Excel. The second process consisted of the coding of the quantitative responses which were then statistically analysed using SPSS. The analysis plan highlighted the primary research questions with reference to the questionnaire items, where nineteen variables were classified as key variables and therefore it was important to conduct a cross-tabulation between these variables and the adoption of cloud computing to establish the deviation in responses. The quantitative analyses of the data were then extended from descriptive and one-way frequency statistics to inferential and regression analysis.

5.2 Preliminary Analysis

This section examines the descriptive statistics for each variable measured using the cloud computing adoption survey. The study involved an initial total of 190 participants, but, after eliminating data entry and respondent errors leading to missing, incomplete or invalid responses during the coding process, the total number of valid respondents decreased to 169.

5.3 Part 1: Personal Information

This section explores the frequencies and descriptive statistics of the responses to the personal information questions in the survey. Coding is structured using a coding template which states the coding rules and categories used, to summarize, the data (see Appendix A). The data are treated as ordinal non-parametric data since the responses are measured as ranks and categories.

Table 5.1: Frequency Statistics (*n*=169)

		Job title	Education level	Organisational sector	Number of employees
N	Valid	169	169	169	169
	Missing	0	0	0	0
Mean		4.01	2.45	2.29	3.27
Median		4.00	3.00	2.00	4.00
Mode		3	3	1	4
Std. deviation		1.516	.779	1.152	1.066
Skewness		-.020	-.980	.336	-1.147
Std. error of skewness		.187	.187	.187	.187
Kurtosis		-1.032	-.643	-1.326	-.159
Std. error of kurtosis		.371	.371	.371	.371
Range		5	2	3	3
Minimum		1	1	1	1
Maximum		6	3	4	4

According to the descriptive statistics on personal information, the group means which indicate the central tendency (normal) of the groups are centred towards IT consultant for job title, master's degree for education level, military organisation for organisational sector, and "1000-5000" as the number of employees in the organisation. The standard deviations show that job title (SD = 1.516) has the highest variation in the distribution of observations, while the education level data (SD = 0.779) is narrowly spread. This evaluation is underscored by the high range of job title variables (R=5) and a low range of education level (R = 2). The skewness for almost all of the variables is negative, which indicates that the responses are significantly clustered on the right-hand side of the arithmetic mean, with extreme responses occurring on the left of the mean resulting in a longer left-hand tail. On the other hand, the distribution of organisational sector data is positively skewed, suggesting that the responses clustered on the left-hand side of the arithmetic mean, with extreme responses occurring on right-hand side of the mean which is evidenced by a longer right-hand tail.

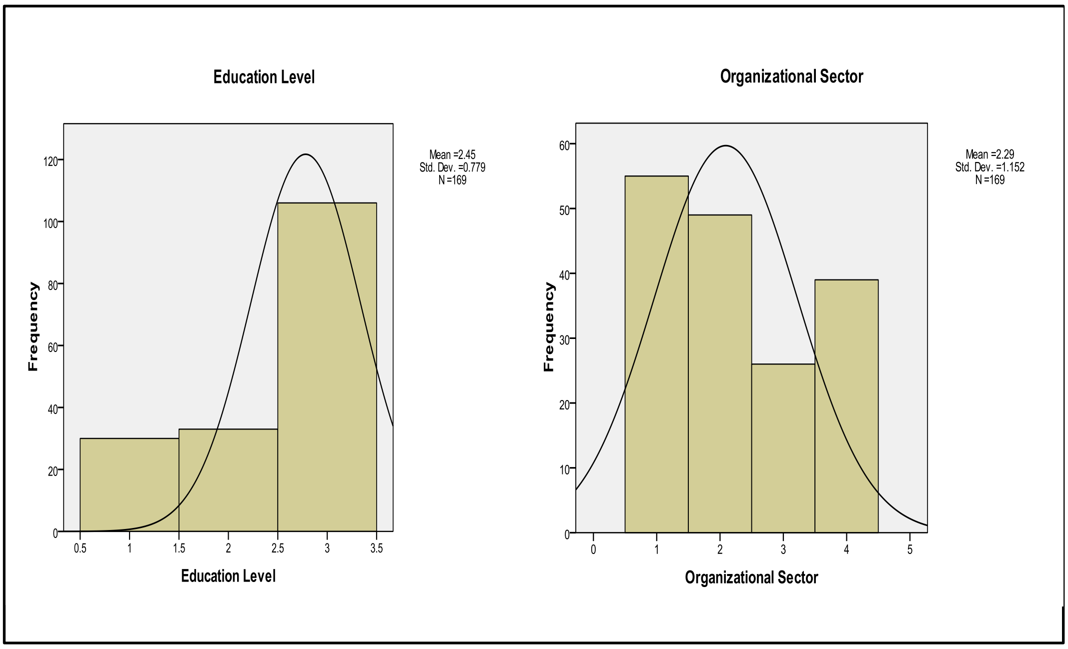


Figure 5.1: Histograms showing the skewness of the normal distribution curves of education level and organisational structure

The platykurtic (negative) densities of the kurtosis of data all for the variables implies that most of the responses are indeed clustered close to the arithmetic mean. This indicates that most of the variance of the data is as a result of frequent and modest deviations.

Table 5.2: Job Title Frequencies (n=169)

	Frequency	Percentage	Valid percentage	Cumulative percentage
IT Director	10	5.9	5.9	5.9
Strategic leader	6	3.6	3.6	9.5
IT Team member	68	40.2	40.2	49.7
IT consultant	19	11.2	11.2	60.9
IT expert	20	11.8	11.8	72.8
Professor/Academic	46	27.2	27.2	100.0
Total	169	100.0	100.0	

For the frequencies of job title, IT team members (n = 68) were the most represented consisting of 40.2% of the respondents, while strategic leaders (n = 6) comprising of top management decision-makers were least represented at 3.6% of respondents. The study also included a significant number of professors and academics (n = 46) who were 27.2% of respondents.

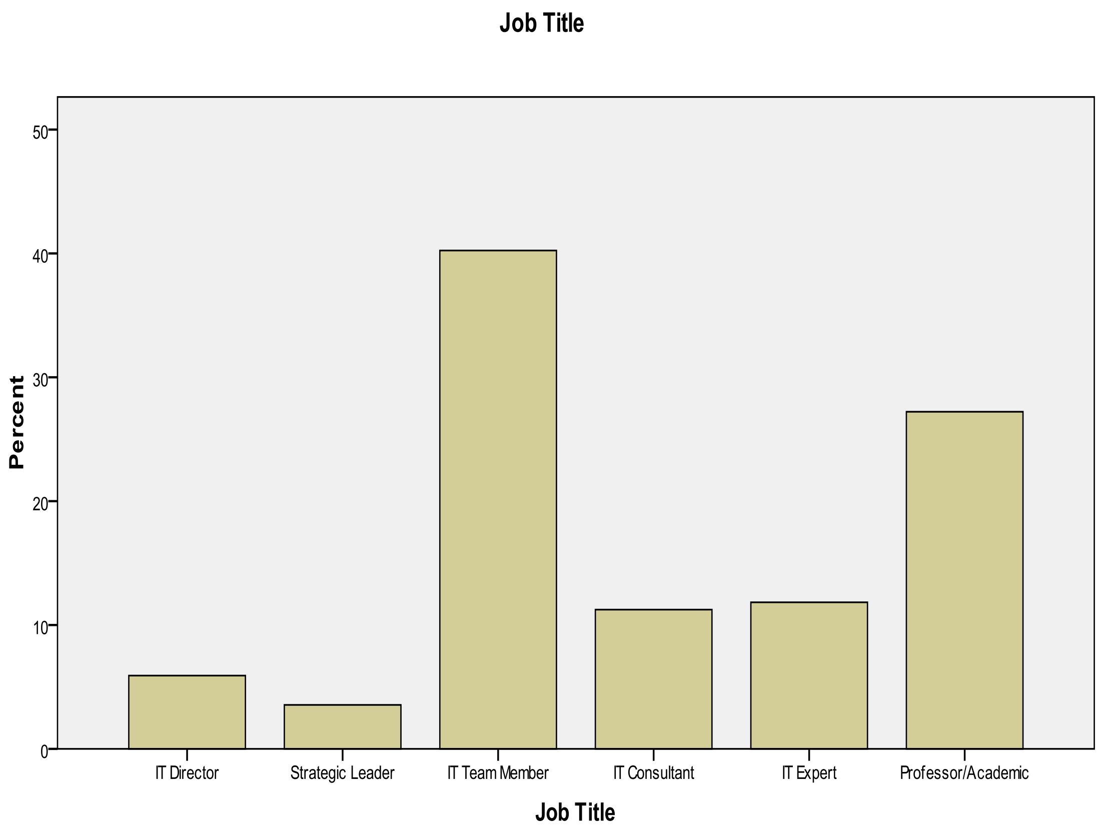


Figure 5.2: Cloud Computing Adoption Survey Responses on Job Title

Table 5.3: Education Level Frequencies (n=169)

	Frequency	Percentage	Valid percentage	Cumulative percentage
PhD Degree	30	17.8	17.8	17.8
Master's Degree	33	19.5	19.5	37.3
Bachelor's Degree	106	62.7	62.7	100.0
Total	169	100.0	100.0	

The frequencies of the education level data show that respondents with a Bachelor's degree (n = 106) were the most represented, comprising 62.7% of the respondents, while holders of a PhD (n = 30) were the least represented, consisting of 17.8% of the respondents. Respondents with a Master's Degree (n = 33) had a similarly low representation, encompassing 19.5% of the respondents which along with PhDs comprised a total of 37.3%.

On the other hand, the frequencies of organisational sector data reveal that a majority of respondents (32.5%) worked in civilian organisations (n = 55). Respondents working in education (n = 26) had the lowest representation in the group, forming 15.4 % of the respondents. Military and independent organisation respondents (n = 49 and 39 respectively) also had significant representation, consisting of 29% and 23.1% of the respondents respectively.

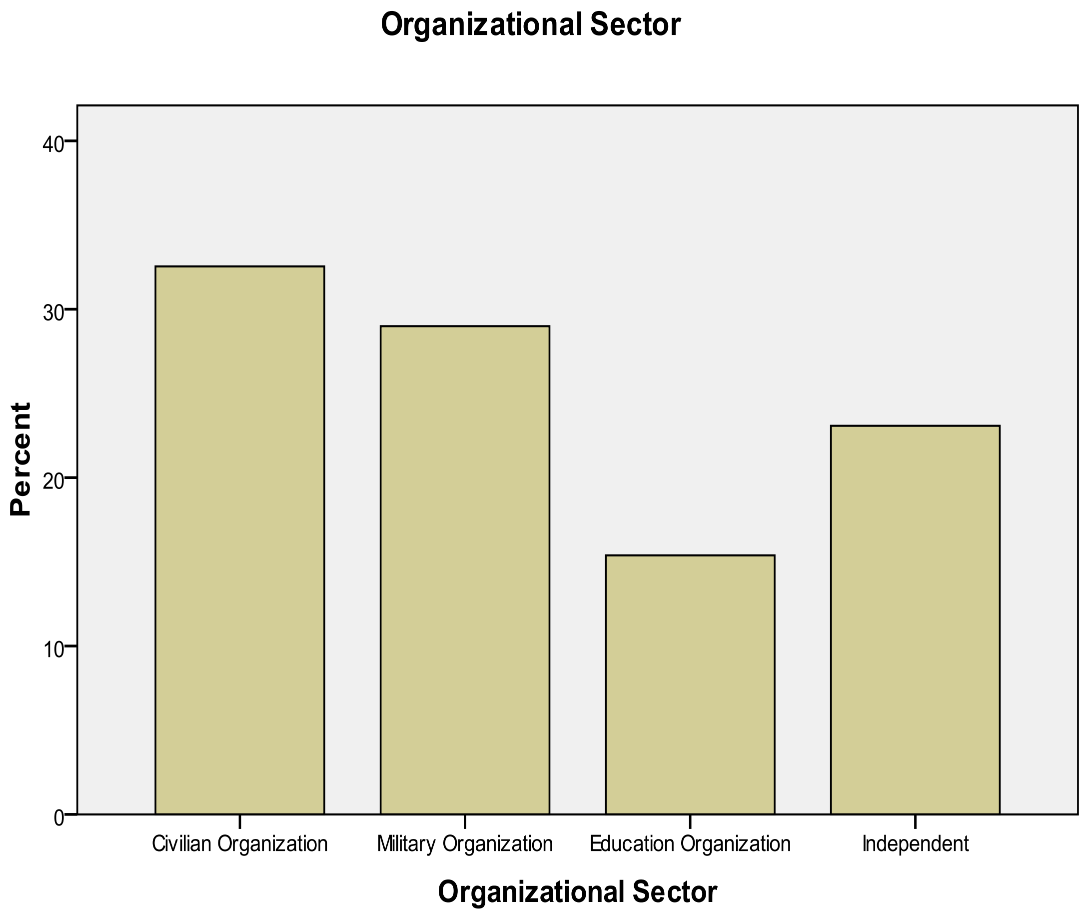


Figure 5.3: Cloud Computing Adoption Survey Responses on Organisational Sector

With reference to the frequencies of the number of employees, respondents working in organisations with more than 5000 employees (n = 104) represented 61.5% of respondents, while those working in organisations with 500-1000 employees and less than 500 employees (n = 19 and 20) were least represented comprising of 11.2% and 11.8% of the respondents respectively.

Table 5.4: Number of Employees Frequencies (n=169)

	Frequency	Percentage	Valid percentage	Cumulative percentage
Less than 500	20	11.8	11.8	11.8
500-1000	19	11.2	11.2	23.1
1000-5000	26	15.4	15.4	38.5
More than 5000	104	61.5	61.5	100.0
Total	169	100.0	100.0	

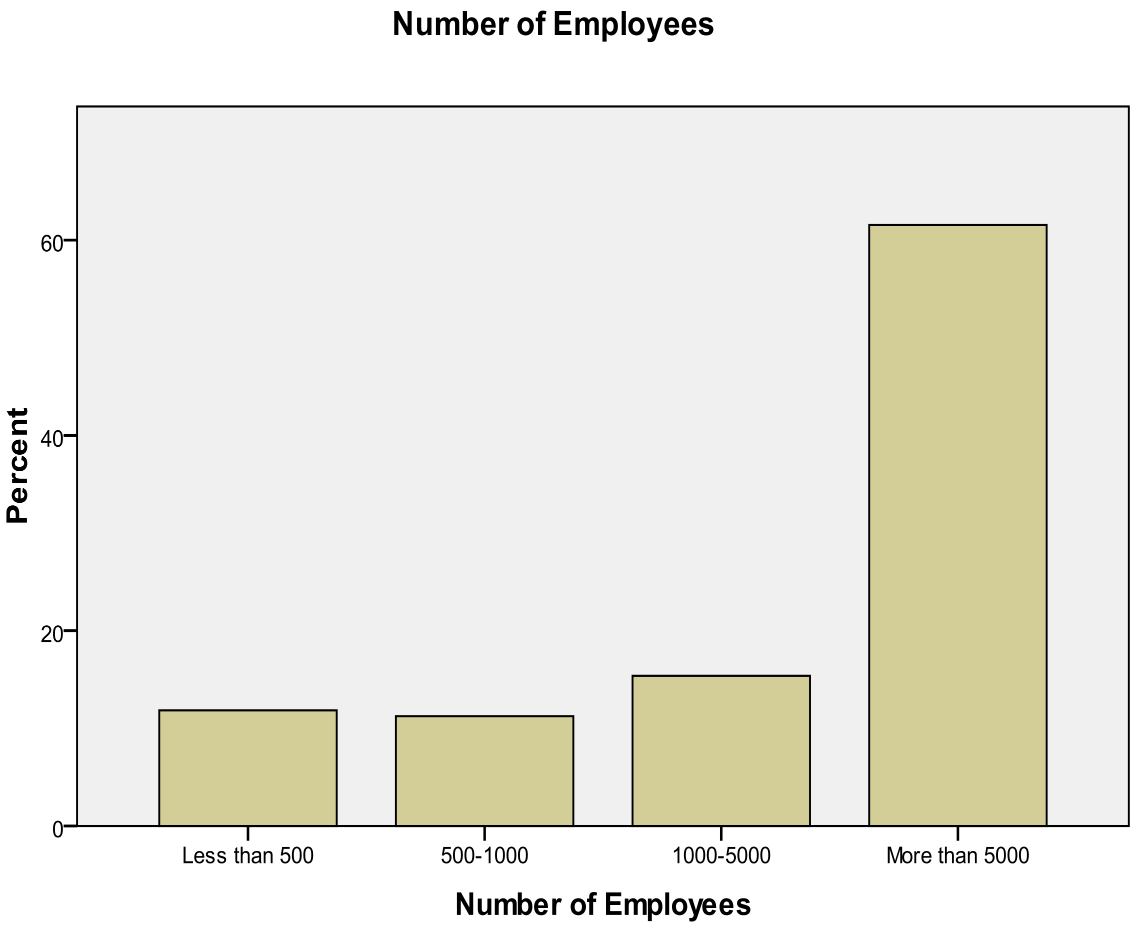


Figure 5.4: Cloud Computing Adoption Survey Responses on Number of Employees

5.4 Part 2: Cloud Computing in General

This section explores the frequencies and descriptive statistics of the responses to the statements presented in the cloud computing Adoption survey. After coding whereby YES = 1 and NO = 2, the data is treated as nominal parametric data since it is a measurement of the responses of a normally distributed population.

The following question aims to measure the support of adoption of cloud computing within an organisation in order to get the required data that will be utilised in the quantitative analysis.

Question # 2.0: Would you support the adoption of cloud computing technology in your organisation?

Adoption Attitude

N Valid	169
Missing	0
Mean	1.20
Median	1.00
Mode	1
Std. Deviation	.402
Skewness	1.504
Std. Error of Skewness	.187
Kurtosis	.266
Std. Error of Kurtosis	.371
Valid	Frequency
YES	135
NO	34

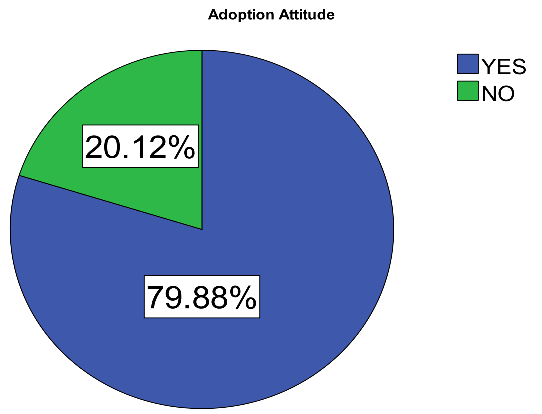


Figure 5.5: Question # 2.0

The following question aims to test whether the factor “service quality “is an important factor in deciding to adopt cloud computing.

Question # 2.1: Do you agree that the service quality is an important factor in deciding to adopt cloud computing in your organisation?

Service Quality

N	Valid	169
	Missing	0
Mean		1.05
Median		1.00
Mode		1
Std. Deviation		.213
Skewness		4.301
Std. Error of Skewness		.187
Kurtosis		16.700
Std. Error of Kurtosis		.371
Valid		Frequency
	YES	161
	NO	8

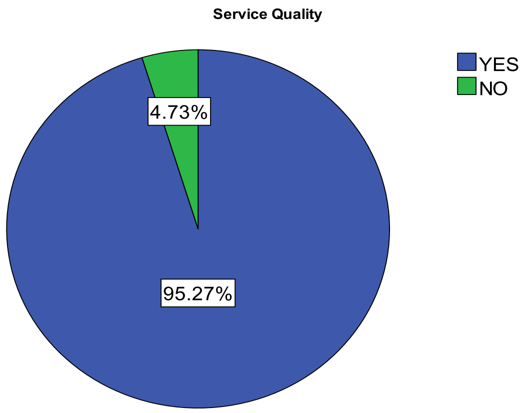


Figure 5.6: Question # 2.1

The following question aims to test whether the factor “usefulness “is an important factor in deciding to adopt cloud computing.

Question #2.2: Do you agree that the usefulness of cloud computing technology is important factor in deciding to adopt Cloud computing in your organisation?

Usefulness

N	Valid	169
	Missing	0
Mean		1.02
Median		1
Mode		1
Std. Deviation		0.152
Skewness		6.323
Std. Error of Skewness		0.187
Kurtosis		38.437
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	165
	NO	4

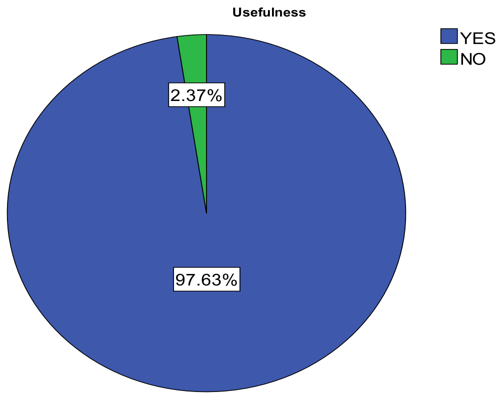


Figure 5.7: Question # 2.2

The following question aims to test whether the factor “security concerns “is an important factor in deciding to adopt cloud computing.

The following question aims to test whether the factor “security concerns“is an important factor in deciding to adopt cloud computing.

Question #2.3: Do you agree that the security concerns is an important factor in deciding to adopt cloud computing in your organisation?

Security Concern

N	Valid	169
	Missing	0
Mean		1.05
Median		1
Mode		1
Std. Deviation		0.213
Skewness		4.301
Std. Error of Skewness		0.187
Kurtosis		16.7
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	161
	NO	8

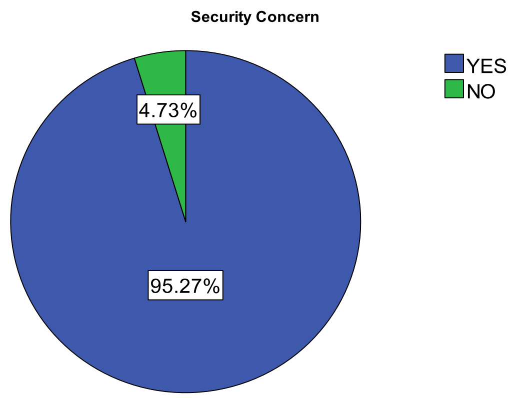


Figure 5.8: Question # 2.3

The following question aims to test whether the factor “complexity “is an important factor in deciding to adopt cloud computing.

Question #2.4: Do you agree that the complexity factor is an important in deciding to adopt cloud computing in your organisation?

Complexity

N	Valid	169
	Missing	0
Mean		1.05
Median		1
Mode		1
Std. Deviation		0.213
Skewness		4.301
Std. Error of Skewness		0.187
Kurtosis		16.7
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	161
	NO	8

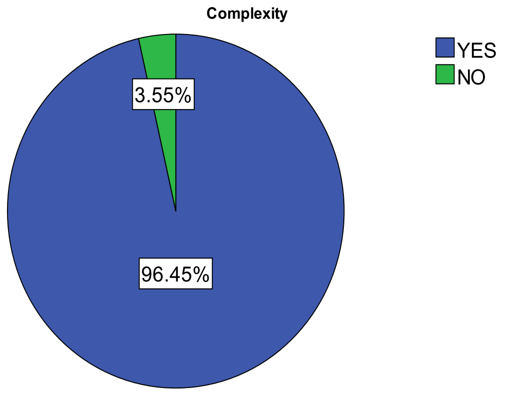


Figure 5.9: Question # 2.4

The following question aims to test whether the factor "cost" is an important factor in deciding to adopt cloud computing.

Question #2.5: Do you agree that the cost is an important factor in deciding to adopt cloud computing in your organisation?

Cost

N	Valid	169
	Missing	0
Mean		1.17
Median		1
Mode		1
Std. Deviation		0.186
Skewness		5.065
Std. Error of Skewness		0.187
Kurtosis		23.941
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	163
	NO	6

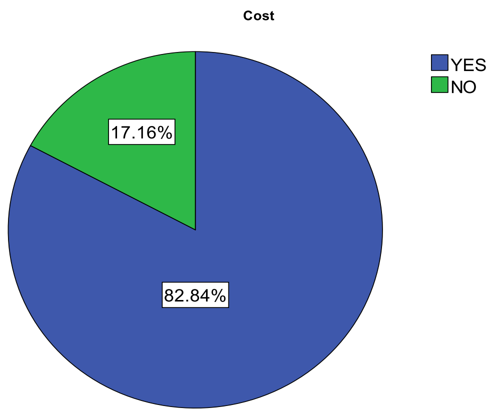


Figure 5.10: Question #2.5

The following question aims to test whether the factor “size of the organisation“ is an important factor in deciding to adopt cloud computing.

Question #2.6: Do you agree that the size of the organisation is an important factor in deciding to adopt cloud computing in your organisation?

Organisation Size

N	Valid	169
	Missing	0
Mean		1.47
Median		1
Mode		1
Std. Deviation		0.5
Skewness		0.132
Std. Error of Skewness		0.187
Kurtosis		-2.007
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	90
	NO	79

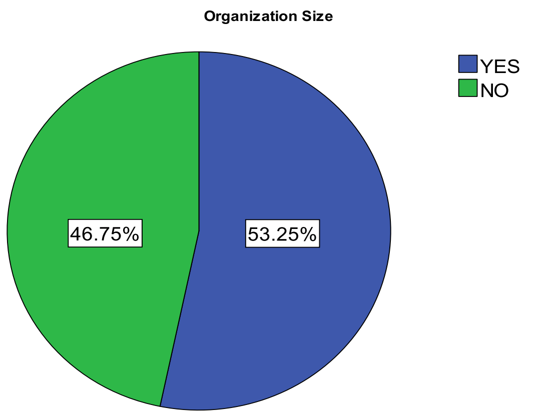


Figure 5.11: Question #2.6

The following question aims to test whether the factor “IT infrastructure readiness “ is an important factor in deciding to adopt cloud computing.

Question #2.7: Do you agree that the IT infrastructure readiness is an important factor in deciding to adopt cloud computing in your organisation?

IT Infrastructure Readiness

N	Valid	169
	Missing	0
Mean		1.23
Median		1
Mode		1
Std. Deviation		0.423
Skewness		1.289
Std. Error of Skewness		0.187
Kurtosis		-0.341
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	130
	NO	39

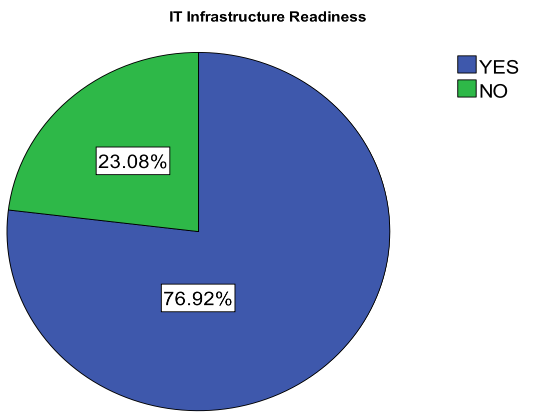


Figure 5.12: Question #2.7

The following question aims to test whether the factor "feasibility " is an important factor in deciding to adopt cloud computing.

Question #2.8: Do you agree that the feasibility is an important factor in deciding to adopt cloud computing in your organisation?

Feasibility

N	Valid	169
	Missing	0
Mean		1.22
Median		1
Mode		1
Std. Deviation		0.415
Skewness		1.372
Std. Error of Skewness		0.187
Kurtosis		-0.12
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	132
	NO	37

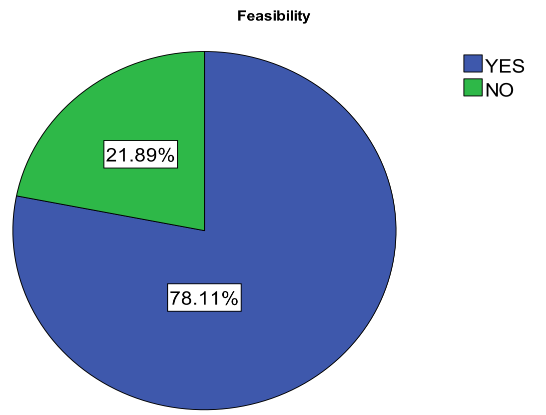


Figure 5.13: Question #2.8

The following question aims to test whether the factor "trust" is an important factor in deciding to adopt cloud computing.

Question #2.9: Do you agree that the trust is an important factor in deciding to adopt cloud computing in your organisation?

Trust

N	Valid	169
	Missing	0
Mean		1.17
Median		1
Mode		1
Std. Deviation		0.373
Skewness		1.815
Std. Error of Skewness		0.187
Kurtosis		1.308
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	141
	NO	28

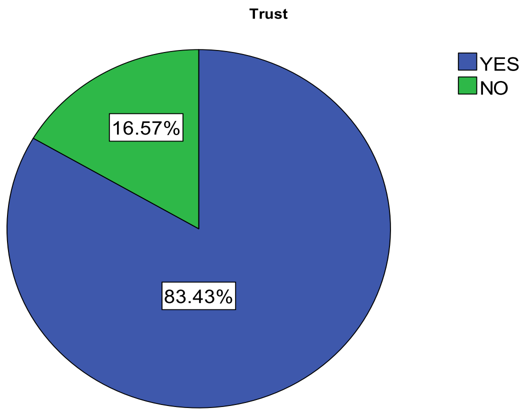


Figure 5.14: Question #2.9

The following question aims to test whether the factor "organisational culture " is an important factor in deciding to adopt cloud computing.

Question #2.10: Do you agree that the organisational culture is an important factor in deciding to adopt cloud computing in your organisation?

Organisational Culture

N	Valid	169
	Missing	0
Mean		1.11
Median		1
Mode		1
Std. Deviation		0.309
Skewness		2.574
Std. Error of Skewness		0.187
Kurtosis		4.681
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	151
	NO	18

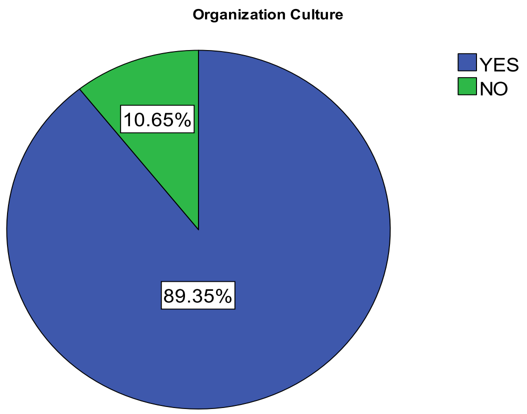


Figure 5.15: Question #2.10

The following question aims to test whether the factor "organisational structure " is an important factor in deciding to adopt cloud computing.

Question #2.11: Do you agree that the organisational structure is an important factor in deciding to adopt cloud computing in your organisation?

Organisational Structure

N	Valid	169
	Missing	0
Mean		1.28
Median		1
Mode		1
Std. Deviation		0.452
Skewness		0.966
Std. Error of Skewness		0.187
Kurtosis		-1.079
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	121
	NO	48

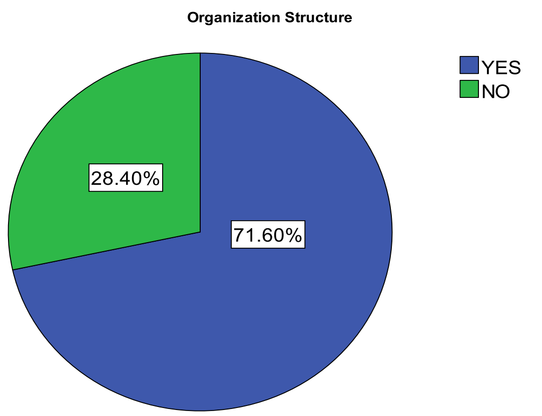


Figure 5.16: Question #2.11

The following question aims to test whether the factor "privacy risk" is an important factor in deciding to adopt cloud computing.

Question #2.12: Do you agree that the privacy risk is an important factor in deciding to adopt cloud computing in your organisation?

Privacy Risk

N	Valid	169
	Missing	0
Mean		1.05
Median		1
Mode		1
Std. Deviation		0.225
Skewness		4.015
Std. Error of Skewness		0.187
Kurtosis		14.289
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	160
	NO	9

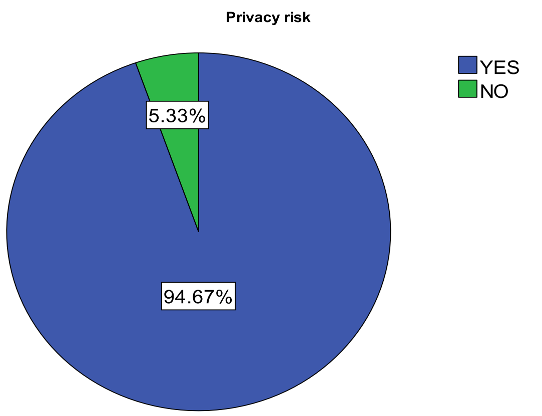


Figure 5.17: Question #2.12

The following question aims to test whether the factor "government support" is an important factor in deciding to adopt cloud computing.

Question #2.13: Do you agree that the government support is an important factor in deciding to adopt cloud computing in your organisation?

Government Support

N	Valid	169
	Missing	0
Mean		1.04
Median		1
Mode		1
Std. Deviation		0.2
Skewness		4.644
Std. Error of Skewness		0.187
Kurtosis		19.802
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	162
	NO	7

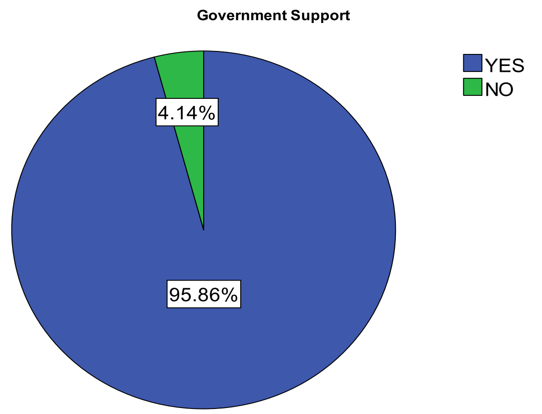


Figure 5.18: Question #2.13

The following question aims to test whether the factor "regulatory concerns" is an important factor in deciding to adopt cloud computing.

Question #2.14: Do you agree that the regulatory concerns is an important factor in deciding to adopt cloud computing in your organisation?

Regulatory Concern

N	Valid	169
	Missing	0
Mean		1.3
Median		1
Mode		1
Std. Deviation		0.458
Skewness		0.903
Std. Error of Skewness		0.187
Kurtosis		-1.2
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	119
	NO	50

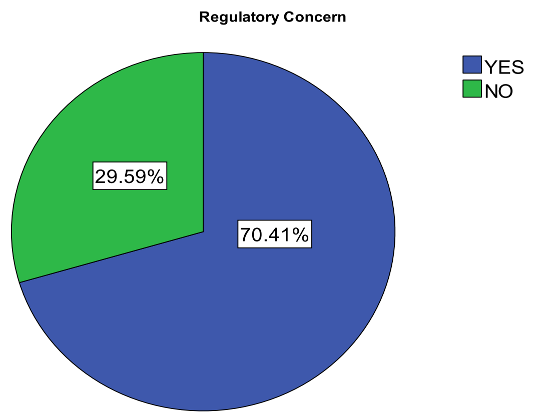


Figure 5.19: Question #2.14

The following question aims to test whether the factor "external pressure" is an important factor in deciding to adopt cloud computing.

Question #2.15: Do you agree that the external pressures is an important factor in deciding to adopt cloud computing in your organisation?

External Pressure

N	Valid	169
	Missing	0
Mean		1.36
Median		1
Mode		1
Std. Deviation		0.482
Skewness		0.584
Std. Error of Skewness		0.187
Kurtosis		-1.679
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	108
	NO	61

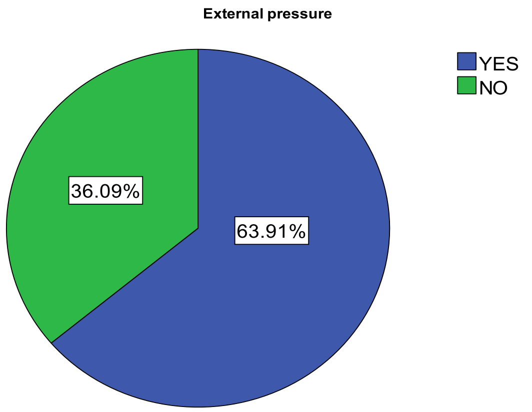


Figure 5.20: Question #2.15

The following question aims to test whether the factor "culture " is an important factor in deciding to adopt cloud computing.

Question #2.16: Do you agree that the culture is important factor in deciding to adopt cloud computing in your organisation?

Culture

N	Valid	169
	Missing	0
Mean		1.08
Median		1
Mode		1
Std. Deviation		0.276
Skewness		3.054
Std. Error of Skewness		0.187
Kurtosis		7.415
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	155
	NO	14

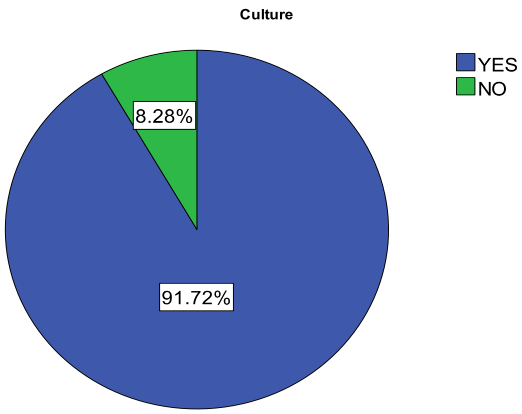


Figure 5.21: Question #2.16

The following question aims to test whether the factor "industry type" is an important factor in deciding to adopt cloud computing.

Question #2.17: Do you agree that the industry type is an important factor in deciding to adopt cloud computing in your organisation?

Industry Type

N	Valid	169
	Missing	0
Mean		1.18
Median		1
Mode		1
Std. Deviation		0.388
Skewness		1.651
Std. Error of Skewness		0.187
Kurtosis		0.733
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	138
	NO	31

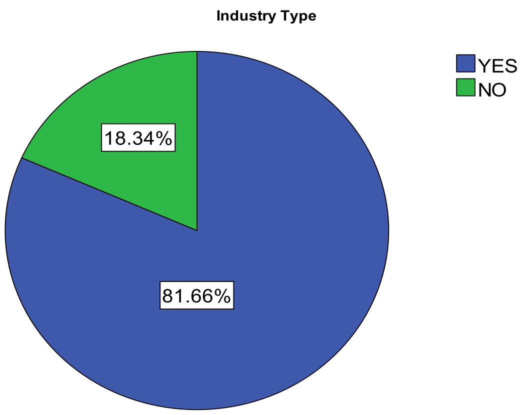


Figure 5.22: Question #2.17

The following question aims to test whether the factor “direct benefit “ is an important factor in deciding to adopt cloud computing.

Question #2.18: Do you agree that the direct benefit is an important factor in deciding to adopt cloud computing in your organisation?

Direct Benefit

N	Valid	169
	Missing	0
Mean		1.28
Median		1
Mode		1
Std. Deviation		0.452
Skewness		0.966
Std. Error of Skewness		0.187
Kurtosis		-1.079
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	121
	NO	48

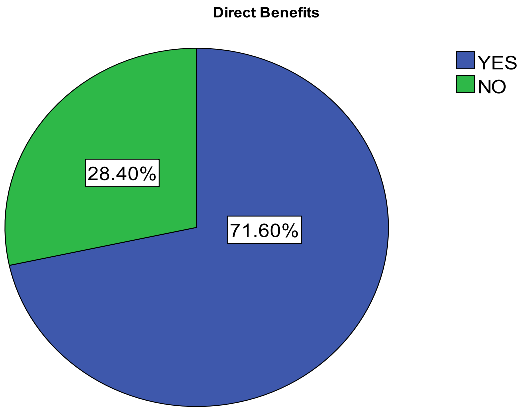


Figure 5.23: Question #2.18

The following question aims to test whether the factor “indirect benefit“ is an important factor in deciding to adopt cloud computing.

Question #2.19: Do you agree that the indirect benefit is an important factor in deciding to adopt cloud computing in your organisation?

Indirect Benefit

N	Valid	169
	Missing	0
Mean		1.19
Median		1
Mode		1
Std. Deviation		0.393
Skewness		1.6
Std. Error of Skewness		0.187
Kurtosis		0.567
Std. Error of Kurtosis		0.371
Valid		Frequency
	YES	137
	NO	32

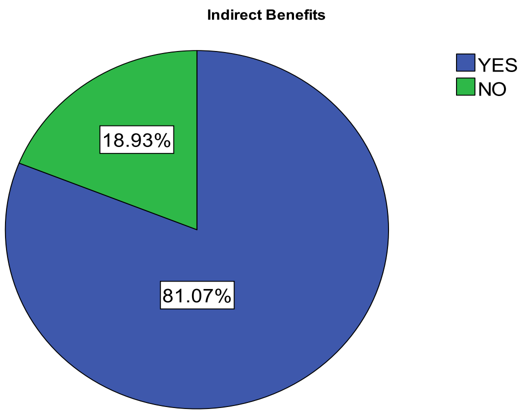


Figure 5.24: Question #2.19

A detailed analysis of the responses to Part 2 of the survey reveals that all the descriptive statistics are oriented towards a central tendency of 1, indicating that a majority of the responses to these questions were agreement. The standard deviation reveals that responses on organisation size (SD = 0.5) had the highest variation in the distribution of observations while responses on usefulness (SD = 0.152) were narrowly spread observations. This evaluation is underscored by the higher mean of the responses on organisation size compared to usefulness (mean = 1.02). The skewness of data for all the variables is positive, which indicates that the responses are significantly clustered on the left-hand side of the arithmetic mean, with extreme responses occurring on the right-hand of the mean resulting in a longer right-hand tail. Responses on usefulness have the highest skewness of 6.323, which is underscored by the high frequency of agreement responses (n = 165) while responses on organisation size have a low skewness of 0.132 also indicated by the low frequency of agreement responses (n = 90). In addition,

The leptokurtic (positive) density of the kurtosis of responses on usefulness implies that the variance in the group is as a result of infrequent and extreme variations in NO responses, while the platykurtic (negative) density of the responses on organisation size indicates that most agreement and disagreement responses are in fact clustered close to the arithmetic mean so that most of the variance within the group is as a result of frequent and modest deviations in NO responses.

5.5 Part 2.1: Psychometric Evaluation of Cloud Computing Adoption

This section explores the frequencies and descriptive statistics of the responses to the Likert scale questions presented in the cloud computing adoption survey. The coding of the multiple latent variables in each group is structured using factor analysis to determine the value of the composite variable for each group. The data is treated as ordinal non-parametric data since it is a measurement of the responses of the ranks and categories within the sample population.

According to the descriptive statistics on the psychometric evaluation of cloud computing adoption, the group means which indicate the central tendency (normal) of the groups are centred towards the response of agreement, except for the responses concerning on organisation size and government support which are oriented towards neither agree nor disagree and strongly agree respectively (see Appendix B). The standard deviation shows that responses on organisation size (SD = 1.608) have the highest variation, while responses on service quality (SD = 0.491) have the lowest variation. The skewness of all the groups is negative which indicates that the responses are significantly clustered on the right-hand side of the arithmetic mean, thus consisting of agree and strongly agree responses, with rare disagreement responses occurring to the left of the mean resulting in a longer left-hand tail. On the other hand, the leptokurtic (positive) densities of the kurtosis of the responses to almost all of the questions implies that the variance in the data is as a result of infrequent disagree and strongly disagree responses, while the platykurtic (negative) density of the responses on organisation size indicates that most of the responses occur close to the arithmetic mean of neither agree nor disagree in the form of agree and disagree and therefore most of the variance within the data is as a result of frequent and modest deviations in the other responses.

The frequencies of responses to the psychometric evaluation of cloud computing adoption are tabulated and illustrated below:

Adoption Attitude

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Disagree	2	1.2	1.2	1.2
	Nether Agree nor Disagree	1	.6	.6	1.8
	Agree	101	59.8	59.8	61.5
	Strongly Agree	65	38.5	38.5	100.0
	Total	169	100.0	100.0	

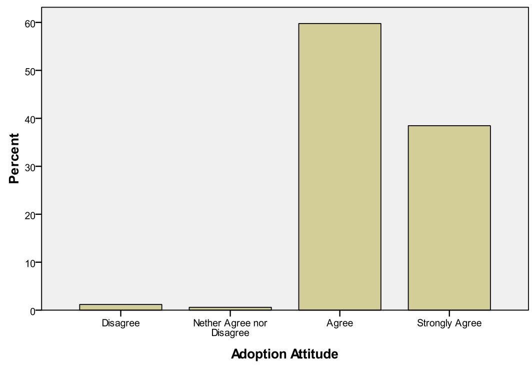


Figure 5.25: Adoption Attitude

Service Quality

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	1	.6	.6	.6
	Disagree	1	.6	.6	1.2
	Nether Agree nor Disagree	4	2.4	2.4	3.6
	Agree	138	81.7	81.7	85.2
	Strongly Agree	25	14.8	14.8	100.0
	Total	169	100.0	100.0	

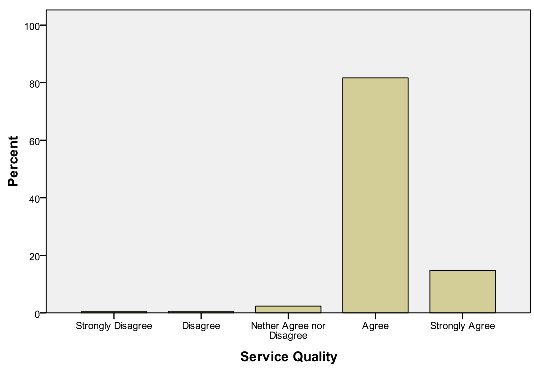


Figure 5.26: Service Quality

Usefulness

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	1	.6	.6	.6
	Disagree	1	.6	.6	1.2
	Nether Agree nor Disagree	3	1.8	1.8	3.0
	Agree	136	80.5	80.5	83.4
	Strongly Agree	28	16.6	16.6	100.0
	Total	169	100.0	100.0	

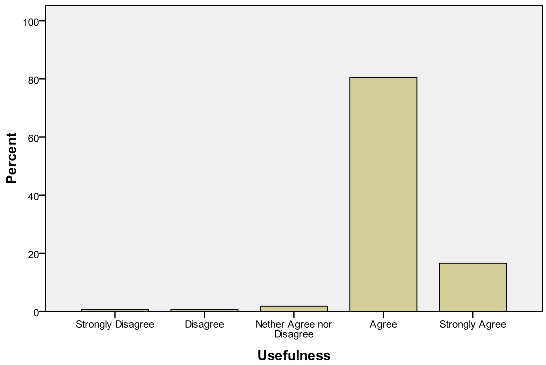


Figure 5.27: Usefulness

Security Concern

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	2	1.2	1.2	1.2
	Disagree	2	1.2	1.2	2.4
	Nether Agree nor Disagree	10	5.9	5.9	8.3
	Agree	111	65.7	65.7	74.0
	Strongly Agree	44	26.0	26.0	100.0
	Total	169	100.0	100.0	

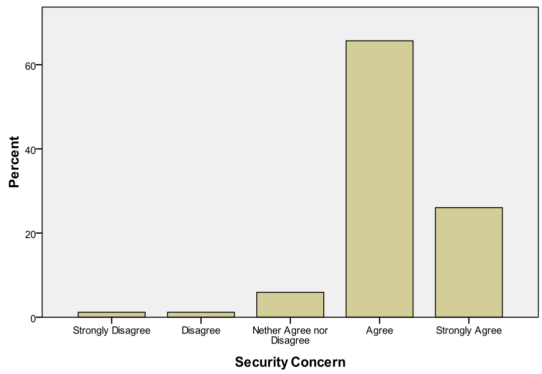


Figure 5.28: Security Concerns

Complexity

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	2	1.2	1.2	1.2
	Disagree	1	.6	.6	1.8
	Nether Agree nor Disagree	3	1.8	1.8	3.6
	Agree	116	68.6	68.6	72.2
	Strongly Agree	47	27.8	27.8	100.0
	Total	169	100.0	100.0	

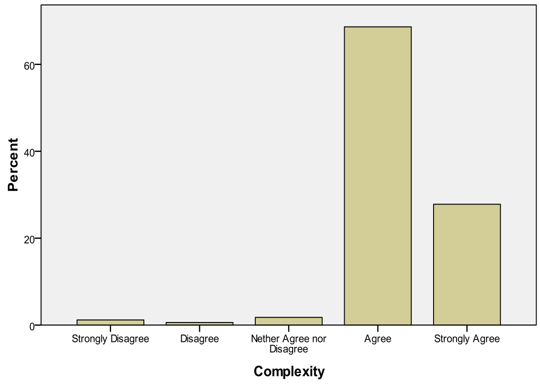


Figure 5.29: Complexity

Cost

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	1	.6	.6	.6
	Disagree	9	5.3	5.3	5.9
	Nether Agree nor Disagree	1	.6	.6	6.5
	Agree	108	63.9	63.9	70.4
	Strongly Agree	50	29.6	29.6	100.0
	Total	169	100.0	100.0	

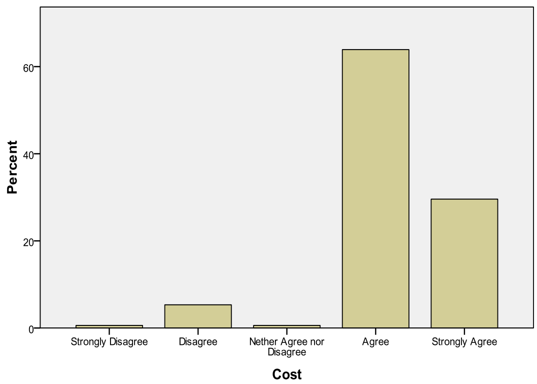


Figure 5.30: Cost

Organisation Size

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	19	11.2	11.2	11.2
	Disagree	60	35.5	35.5	46.7
	Nether Agree nor Disagree	5	3.0	3.0	49.7
	Agree	5	3.0	3.0	52.7
	Strongly Agree	80	47.3	47.3	100.0
	Total	169	100.0	100.0	

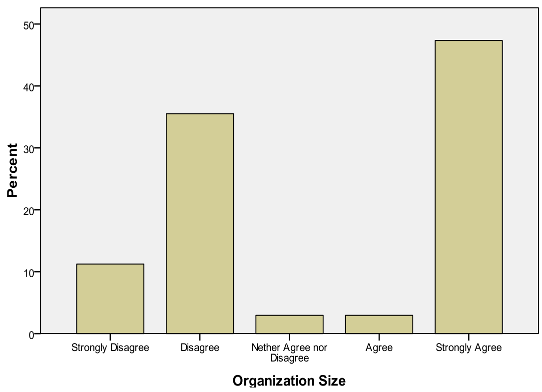


Figure 5.31: Organisation Size

IT Infrastructure Readiness

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	5	3.0	3.0	3.0
	Disagree	14	8.3	8.3	11.2
	Nether Agree nor Disagree	2	1.2	1.2	12.4
	Agree	94	55.6	55.6	68.0
	Strongly Agree	54	32.0	32.0	100.0
	Total	169	100.0	100.0	

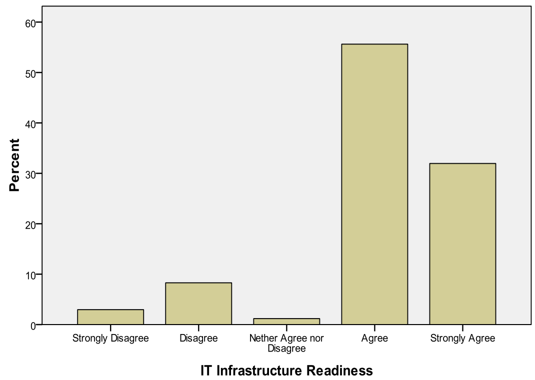


Figure 5.32: IT Infrastructure Readiness

Feasibility

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	2	1.2	1.2	1.2
	Disagree	16	9.5	9.5	10.7
	Nether Agree nor Disagree	5	3.0	3.0	13.6
	Agree	118	69.8	69.8	83.4
	Strongly Agree	28	16.6	16.6	100.0
	Total	169	100.0	100.0	

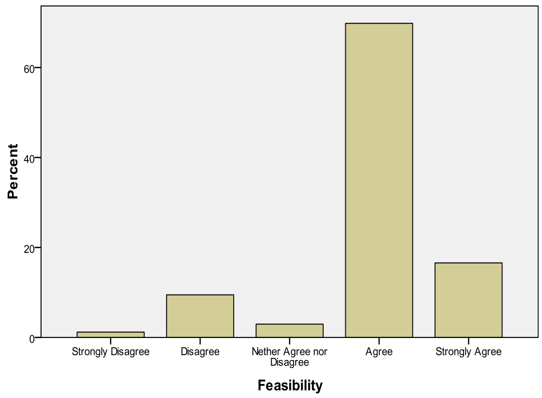


Figure 5.33: Feasibility

Trust

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	4	2.4	2.4	2.4
	Disagree	9	5.3	5.3	7.7
	Nether Agree nor Disagree	6	3.6	3.6	11.2
	Agree	139	82.2	82.2	93.5
	Strongly Agree	11	6.5	6.5	100.0
	Total	169	100.0	100.0	

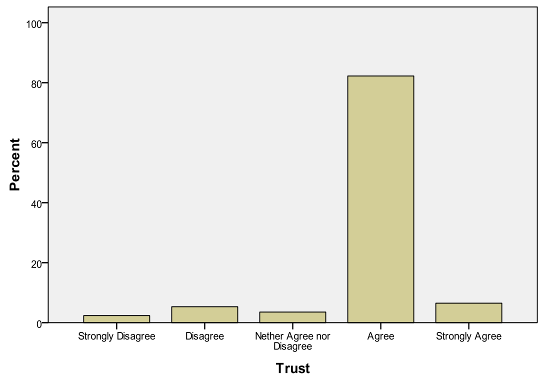


Figure 5.34: Trust

Organisational Culture

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	1	.6	.6	.6
	Disagree	5	3.0	3.0	3.6
	Nether Agree nor Disagree	4	2.4	2.4	5.9
	Agree	101	59.8	59.8	65.7
	Strongly Agree	58	34.3	34.3	100.0
	Total	169	100.0	100.0	

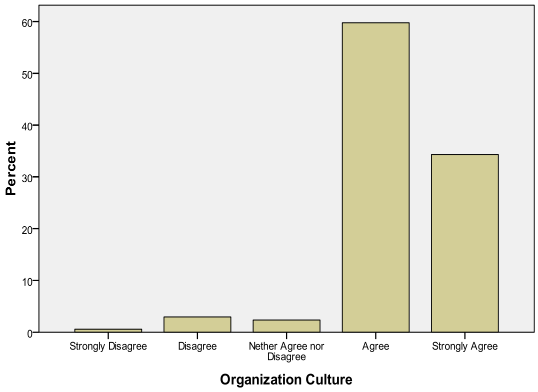


Figure 5.35: Organisational Culture

Organisational Structure

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Strongly Disagree	5	3.0	3.0	3.0
	Disagree	11	6.5	6.5	9.5
	Nether Agree nor Disagree	5	3.0	3.0	12.4
	Agree	137	81.1	81.1	93.5
	Strongly Agree	11	6.5	6.5	100.0
	Total	169	100.0	100.0	

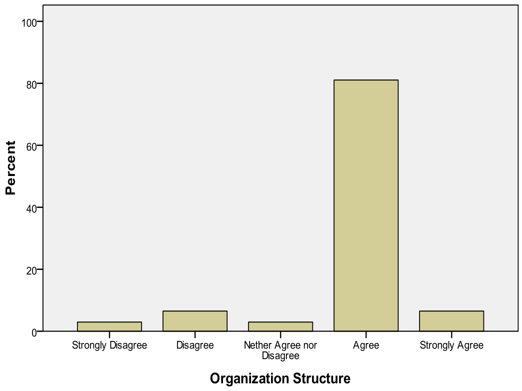


Figure 5.36: Organisational Structure

Privacy risk

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Disagree	5	3.0	3.0	3.0
	Nether Agree nor Disagree	1	.6	.6	3.6
	Agree	82	48.5	48.5	52.1
	Strongly Agree	81	47.9	47.9	100.0
	Total	169	100.0	100.0	

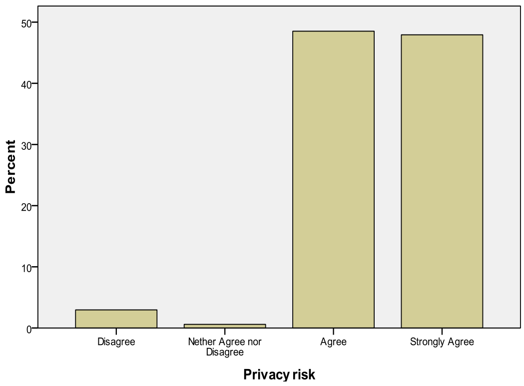


Figure 5.37: Privacy Risk

Government Support

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Disagree	3	1.8	1.8	1.8
	Nether Agree nor Disagree	4	2.4	2.4	4.1
	Agree	61	36.1	36.1	40.2
	Strongly Agree	101	59.8	59.8	100.0
	Total	169	100.0	100.0	

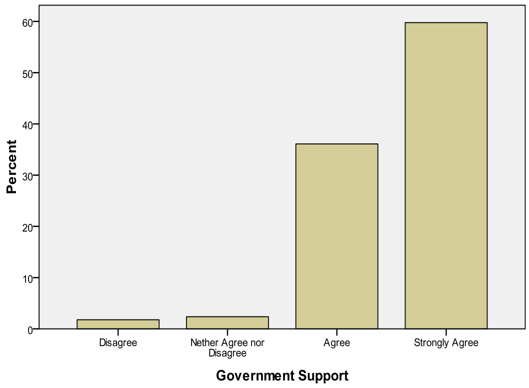


Figure 5.38: Government Support

Regulatory Concern

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	5	3.0	3.0	3.0
	Disagree	20	11.8	11.8	14.8
	Nether Agree nor Disagree	7	4.1	4.1	18.9
	Agree	107	63.3	63.3	82.2
	Strongly Agree	30	17.8	17.8	100.0
	Total	169	100.0	100.0	

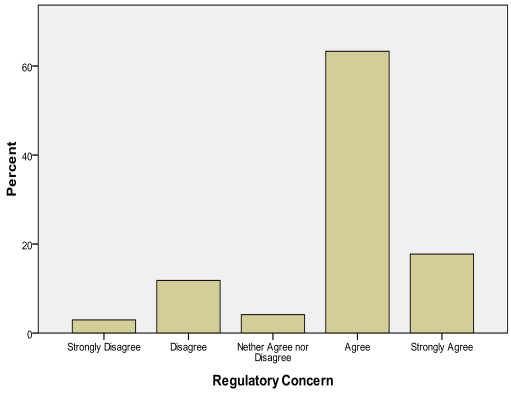


Figure 5.39: Regulatory Concerns

External Pressure

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	22	13.0	13.0	13.0
	Disagree	9	5.3	5.3	18.3
	Nether Agree nor Disagree	11	6.5	6.5	24.9
	Agree	108	63.9	63.9	88.8
	Strongly Agree	19	11.2	11.2	100.0
	Total	169	100.0	100.0	

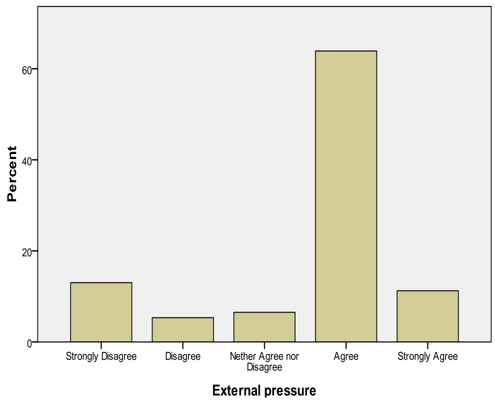
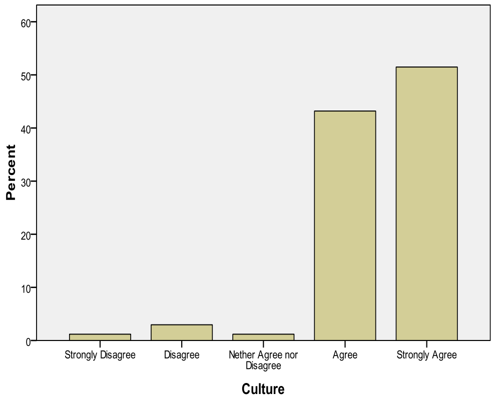


Figure 5.40: External Pressures

Culture

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	2	1.2	1.2	1.2
	Disagree	5	3.0	3.0	4.1
	Nether Agree nor Disagree	2	1.2	1.2	5.3
	Agree	73	43.2	43.2	48.5
	Strongly Agree	87	51.5	51.5	100.0
	Total	169	100.0	100.0	



Industry Type

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	5	3.0	3.0	3.0
	Disagree	11	6.5	6.5	9.5
	Nether Agree nor Disagree	10	5.9	5.9	15.4
	Agree	121	71.6	71.6	87.0
	Strongly Agree	22	13.0	13.0	100.0
	Total	169	100.0	100.0	

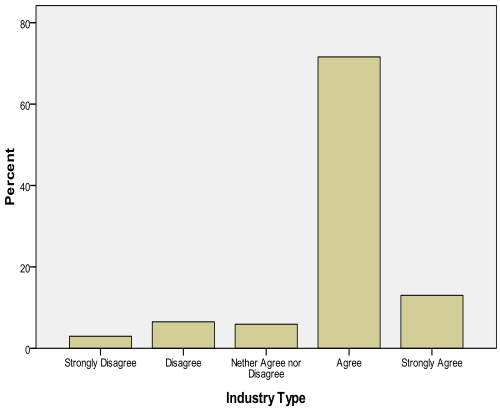


Figure 5.41: Industry Type

Direct Benefits

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Strongly Disagree	10	5.9	5.9	5.9
	Disagree	14	8.3	8.3	14.2
	Nether Agree nor Disagree	6	3.6	3.6	17.8
	Agree	98	58.0	58.0	75.7
	Strongly Agree	41	24.3	24.3	100.0
	Total	169	100.0	100.0	

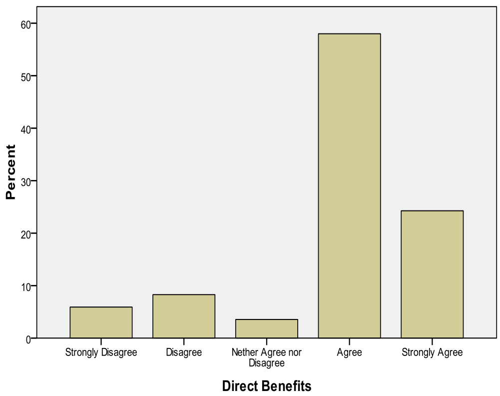


Figure 5.42: Direct Benefits

Indirect Benefits

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Strongly Disagree	6	3.6	3.6	3.6
	Disagree	9	5.3	5.3	8.9
	Nether Agree nor Disagree	10	5.9	5.9	14.8
	Agree	118	69.8	69.8	84.6
	Strongly Agree	26	15.4	15.4	100.0
	Total	169	100.0	100.0	

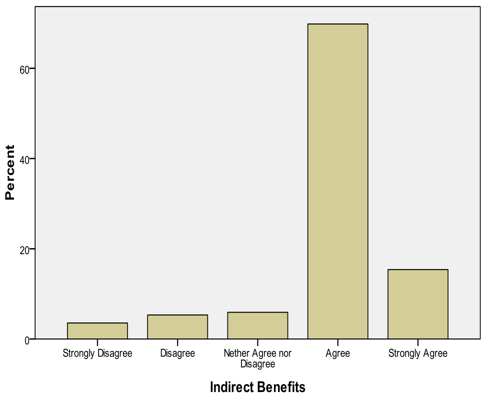


Figure 5.43: Indirect Benefits

5.6 Inferential Analysis

In this section applies inferential statistical methods are applied in order to draw conclusions from the data obtained from the responses to the cloud computing adoption survey; in particular, concerning the perceptions and attitudes towards cloud computing technology among the population from whom the sample is drawn. In addition, inferential statistics are used to determine the probability that the differences found in the descriptive analysis of the data are statistically significant could have occurred by chance. While descriptive statistics simply express variations in the data, inferential statistics enable the development of accurate inferences from the data to the general population represented by the sample.

5.6.1 T-Tests

The T-test analysis have been conducted to test the hypotheses and examine the significance of the factors predicted to affect the adoption of cloud computing. The results show that the values of the statistics for the nineteen factors have a P value of less than 0.005, which means that they all have a significant effect on adoption of cloud computing (see Table 5.5).

Table 5.5: T-test Analysis

Adoption Attitude	Levene's Test for Equality of Variances		T-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	9.342	.003	-6.407	167	.000	-.839	.131	-1.097	-.580
Service Quality			-28.823	160.000	.000	-.839	.029	-.896	-.781
Usefulness			-27.166	164.000	.000	-.818	.030	-.878	-.759
Security Concerns			-28.823	160.000	.000	-.839	.029	-.896	-.781
Complexity			-27.948	162.000	.000	-.828	.030	-.887	-.770
Cost			-61.262	139.000	.000	-.964	.016	-.995	-.933
Organisation Size			-7.677	78.000	.000	-.430	.056	-.542	-.319
IT Infrastructure			-16.075	38.000	.000	-.872	.054	-.982	-.762
Feasibility			-20.199	36.000	.000	-.919	.045	-1.011	-.827
Trust			-56.125	140.000	.000	-.957	.017	-.991	-.924
Organizational Culture			-35.576	150.000	.000	-.894	.025	-.944	-.844
Organisational Structure			-10.684	47.000	.000	-.708	.066	-.842	-.575
Privacy Risk			-29.302	159.000	.000	-.844	.029	-.901	-.787
Government Support			-28.373	161.000	.000	-.833	.029	-.891	-.775
Regulatory Concerns			-10.204	49.000	.000	-.680	.067	-.814	-.546
External Pressures			-8.692	60.000	.000	-.557	.064	-.686	-.429
Culture			-32.241	154.000	.000	-.871	.027	-.924	-.818
Industry Type			-78.518	137.000	.000	-.978	.012	-1.003	-.954
Direct Benefits			-10.684	47.000	.000	-.708	.066	-.842	-.575

Table 5.5: T-test Analysis									
	Levene's Test for Equality of Variances		T-test for Equality of Means						
								95% Confidence Interval of the Difference	
Adoption Attitude	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	9.342	.003	-6.407	167	.000	-.839	.131	-1.097	-.580
Indirect Benefits			-95.812	136.000	.000	-.985	.010	-1.006	-.965

Table 5.6: T-test Service Quality					
Service Quality					
	Service quality	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Adoption Attitude	**Yes**	**161**	**1.16**	**.369**	**.029**
	No	**8**	**2.0**	**.0**	**.0**

The results of the t-test show that the respondents who considered service quality to be an important factor in the adoption of cloud computing have a statistically significant less favourable attitude towards adoption (mean = 1.16) at the 5% level of significance when compared to respondents who did not consider service quality as an important factor: t (167) = -6.407, p = 0.000 (See Appendix B).

Table 5.7: T-test Usefulness					
Usefulness					
	Usefulness	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Adoption Attitude	**Yes**	**165**	**1.18**	**.387**	**.030**
	No	**4**	**2.0**	**.0**	**.0**

The t-test results show that the respondents who considered the usefulness of cloud computing technology to be an important factor in this adoption of cloud computing have a statistically significant less positive attitude to adoption (mean = 1.18) at the 5% level of significance when compared to respondents who did not consider the usefulness of cloud computing technology to be important: t (167) = -4.217, p = 0.000.

Table 5.8: T-test Security Concerns					
Security Concerns					
	Security Concern	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	161	1.16	.369	.029
	No	8	2.0	.0	.0

The t-test results for security concerns show that the respondents who considered the security of cloud computing technology to be an important factor in this adoption have a statistically significant more negative attitude about adoption (mean = 1.16) at the 5% level of significance when compared to respondents who did not consider the usefulness of cloud computing technology to be an important: t (167) = -6.417, p = 0.000.

Table 5.9: T-test Complexity					
Complexity					
	Complexity	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	163	1.17	.378	.030
	No	6	2.0	.0	.0

The t-test results show that the respondents who considered the complexity of cloud computing technology to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.17) at the 5% level of significance when compared to respondents who did not consider the usefulness of cloud computing technology to be an important factor: t (167) = -6.417, p = 0.000.

Table 5.10: T-test Cost					
Cost					
	Cost	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	140	1.04	.186	.016
	No	29	2.0	.0	.0

The t-test results show that the respondents who considered the cost of cloud computing technology to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.04) at the 5% level of significance when compared to respondents who did not consider cost of cloud computing technology to be an important: t (167) = -27.816, p = 0.000.

Table 5.11: T-test Organisation Size					
Organisation Size					
	Organisation Size	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	90	1.0	.0	.0
	No	79	1.43	.498	.056

The t-test results show that the respondents who considered the size of the organisation to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider the size of the organisation to be an important factor: t (167) = -8.197, p = 0.000.

Table 5.12: T-test IT Infrastructure Readiness					
IT Infrastructure Readiness					
	IT Infrastructure Readiness	N	Mean	Std. Deviation	Std. Error Mean
Adoption Attitude	Yes	130	1.0	.0	.0
	No	39	1.87	.339	.054

The t-test results show that the respondents who considered the IT infrastructure readiness of the organisation to be an important factor to the adoption of cloud computing have a statistically significant less favourable adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider the IT infrastructure readiness of the organisation to be an important: t (167) = -29.556, p = 0.000.

Table 5.13: T-test Feasibility					
Feasibility					
	Feasibility	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Adoption Attitude	**Yes**	**132**	**1.0**	**.0**	**.0**
	No	**37**	**1.92**	**.277**	**.045**

The t-test results show that the respondents who considered feasibility to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider feasibility as an important factor: t (167) = -38.449, p = 0.000.

Table 5.14: T-test Trust					
Trust Group Statistics					
	Trust	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Adoption Attitude	**Yes**	**141**	**1.04**	**.203**	**.017**
	No	**28**	**2.0**	**.0**	**.0**

The t-test results show that the respondents who considered trust to be an important factor to the adoption of cloud computing have a statistically significant more negative adoption attitude (mean = 1.04) at the 5% level of significance when compared to respondents who did not consider trust as an important factor: t (167) = -24.951, p = 0.000.

Table 5.15: T-test Organisational Culture					
Organisational Culture					
	Organisation Culture	N	Mean	Std. Deviation	Std. Error Mean
Adoption Attitude	Yes	151	1.11	.309	.025
	No	18	2.0	.0	.0

The t-test results show that the respondents who considered organisational culture to be an important factor to the adoption of cloud computing have a statistically significant less favourable adoption attitude (mean = 1.11) at the 5% level of significance when compared to respondents who did not consider organisation culture to be an important factor: *t* (167) = -12.251, *p* = 0.000.

Table 5.16: T-test Organisational Structure					
Organisational Structure					
	Organisation Structure	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	121	1.00	.0	.0
	No	48	1.71	.459	.066

The t-test results show that the respondents who considered the organisational structure to be an important factor to the adoption of cloud computing have a statistically significant less favourable adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider the organisation structure to be an important factor: *t* (167) = -17.041, *p* = 0.000.

Table 5.17: T-test Privacy					
Privacy Risk					
	Privacy risk	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	160	1.16	.364	.029

Table 5.17: T-test Privacy					
Privacy Risk					
	Privacy risk	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	160	1.16	.364	.029
	No	9	2.0	.0	.0

The t-test results show that the respondents who considered the privacy risk to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.16) at the 5% level of significance when compared to respondents who did not consider the privacy risk to be an important factor:

t (167) = -6.930, p = 0.000.

Table 5.18: T-test Government Support					
Government Support					
	Government Support	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	162	1.17	.374	.029
	No	7	2.0	.0	.0

The t-test results show that the respondents who considered the government support to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.17) at the 5% level of significance when compared to respondents who did not consider the government support to be an important factor: t (167) = -5.881, p = 0.000.

Table 5.19: T-test Regulatory Concerns					
Regulatory Concerns					
	Regulatory Concern	N	Mean	Std. deviation	Std. Error mean
Adoption Attitude	Yes	119	1.0	.0	.0

Table 5.19: T-test Regulatory Concerns					
Regulatory Concerns					
	Regulatory Concern	N	Mean	Std. deviation	Std. Error mean
Adoption Attitude	Yes	119	1.0	.0	.0
	No	50	1.68	.471	.067

The t-test results for show that the respondents who considered the regulatory concerns to be an important factor to the adoption of cloud computing have a statistically significant more negative adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider the regulatory concerns to be an important factor: t (167) = -15.808, p = 0.000.

Table 5.20: T-test External Pressures					
External Pressures					
	External pressure	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	108	1.0	.0	.0
	No	61	1.56	.501	.064

The t-test results show that the respondents who considered the external pressures to be an important factor to the adoption of cloud computing have a statistically significant more negative adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider the external pressures to be an important factor: t (167) = -11.593, p = 0.000.

Table 5.21: T-test Culture					
Culture					
	Culture	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	155	1.13	.336	.027

Table 5.21: T-test Culture					
Culture					
	Culture	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	155	1.13	.336	.027
	No	14	2.0	.0	.0

The t-test results show that the respondents who considered the culture to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.13) at the 5% level of significance when compared to respondents who did not consider the culture to be an important factor: t (167) = -9.663, p = 0.000.

Table 5.22: T-test Industry Type					
Industry Type					
	Industry Type	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	138	1.02	.146	.012
	No	31	2.0	.0	.0

The t-test results show that the respondents who considered the industry type to be an important factor to the adoption of cloud computing have a statistically significant less favourable adoption attitude (mean = 1.02) at the 5% level of significance when compared to respondents who did not consider the external industry type to be an important factor: t (167) = -37.128, p = 0.000.

Table 5.23: T-test Direct Benefit					
Direct Benefit					
	Direct Benefits	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	121	1.0	.0	.0
	No	48	1.71	.459	.066

The t-test results show that the respondents who considered direct benefits to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.00) at the 5% level of significance when compared to respondents who did not consider direct benefit to be an important factor:

t (167) = -17.041, p = 0.000.

Table 5.24: T-test Indirect Benefit					
Indirect Benefit					
	Indirect Benefits	N	Mean	Std. deviation	Std. error mean
Adoption Attitude	Yes	137	1.01	.120	.010
	No	32	2.0	.0	.0

The t-test results show that the respondents who considered indirect benefits to be an important factor to the adoption of cloud computing have a statistically significant less positive adoption attitude (mean = 1.01) at the 5% level of significance when compared to respondents who did not consider indirect benefit to be an important factor:

t (167) = -46.200, p = 0.000.

According to the t-test results, most respondents supported the adoption of cloud computing despite the importance of the respective variables. This assessment is underscored by the fact that the absolute values of the statistic (t-values) are lower than the values of the degrees of freedom.

5.7 ANOVA

The analysis of variance (ANOVA) offers an alternative inferential methodology to complement the t-tests, can be used to compare the mean differences of the variables relative to adoption attitude. ANOVA is conducted on both the personal information and attitude variables to determine whether there are significant statistical differences (trends) in relation to the adoption of cloud computing, which is the dependent variable.

Table 5.25: ANOVA Job Title					
Job Title					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.290	5	3.658	67.225	.000
Within Groups	8.870	163	.054		
Total	27.160	168			

According to the F statistic (F = 67.225) and p-value (p = 0.000) for the job title, the mean levels of adoption attitudes for the six job titles are statistically significantly different. To determine for which job titles adoption attitudes are different, a post-hoc test was conducted using the Scheffe multiple comparison. This shows that the attitudes of professors and academics are significantly different from those the other expressed by respondent with the job titles (see Appendix C).

Table 5.26: ANOVA Education Level					
Education Level					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.065	2	2.033	14.611	.000
Within Groups	23.094	166	.139		
Total	27.160	168			

The F statistic (F = 14.611) and p-value (p = 0.000) for education level indicates that the mean adoption attitudes for the three education levels are statistically significantly different. The Scheffe multiple comparison indicates that the adoption attitudes of those with Bachelor's degree are significantly different from those of respondents at the other two education levels.

Table 5.27: ANOVA Organisational Sector					
Organisational Sector					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	22.801	3	7.600	287.692	.000
Within Groups	4.359	165	.026		
Total	27.160	168			

The F statistic (F = 287.692) and p-value (p = 0.000) for the organisational sector also indicate that the mean adoption attitudes of respondents from the four organisation sectors are statistically significantly different. The Scheffe multiple comparison indicates that the mean attitude of employees of independent organisations is significantly different from those in other sectors.

Table 5.28: ANOVA Number of Employees					
Number of Employees					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.275	3	1.425	10.275	.000
Within Groups	22.885	165	.139		
Total	27.160	168			

The F statistic (F = 10.275) and p-value (p = 0.000) for the number of employees also indicate that mean adoption attitudes of respondents from the four types of organisation are statistically significantly different. The Scheffe multiple comparison indicates that the mean adoption attitude of respondents from organisations with more than 5000 employees is significantly different from those of other organisations with lower numbers of employees.

Table 5.29: ANOVA Service Quality					
Service Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.359	1	5.359	41.047	.000
Within Groups	21.801	167	.131		
Total	27.160	168			

The F statistic (F = 41.047) and p-value (p = 0.000) for service quality ANOVA also indicate that the mean adoption attitudes for this variable is statistically significant.

Table 5.30: ANOVA Usefulness					
Usefulness ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.614	1	2.614	17.787	.000
Within Groups	24.545	167	.147		
Total	27.160	168			

The F statistic (F = 17.787) and p-value (p = 0.000) for usefulness indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.31: ANOVA Security Concerns					
Security Concern s					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.359	1	5.359	41.047	.000
Within Groups	21.801	167	.131		
Total	27.160	168			

The F statistic (F = 41.047) and p-value (p = 0.000) for security concerns indicate that mean adoption attitude of the variable is statistically significant.

Table 5.32: ANOVA Complexity					
Complexity					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.970	1	3.970	28.586	.000
Within Groups	23.190	167	.139		
Total	27.160	168			

The F statistic (F = 28.586) and p-value (p = 0.000) for complexity indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.33: ANOVA Cost					
Cost					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	22.338	1	22.338	773.734	.000
Within Groups	4.821	167	.029		
Total	27.160	168			

The F statistic (F = 773.734) and p-value (p = 0.000) for cost indicates that the mean adoption attitude of the variable is statistically significant.

Table 5.34: Organisation Size					
Organisation Size					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.793	1	7.793	67.195	.000
Within Groups	19.367	167	.116		
Total	27.160	168			

The F statistic (F = 67.195) and p-value (p = 0.000) for organisation size indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.35: ANOVA IT Infrastructure Readiness					
IT Infrastructure Readiness					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	22.801	1	22.801	873.538	.000
Within Groups	4.359	167	.026		
Total	27.160	168			

The F statistic (F = 837.538) and p-value (p = 0.000) for IT infrastructure readiness indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.36: ANOVA Feasibility					
Feasibility					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24.403	1	24.403	1478.296	.000
Within Groups	2.757	167	.017		
Total	27.160	168			

The F statistic (F = 1478.269) and p-value (p = 0.000) for feasibility indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.37: ANOVA Trust					
Trust					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.415	1	21.415	622.544	.000
Within Groups	5.745	167	.034		
Total	27.160	168			

The F statistic (F = 622.544) and p-value (p = 0.000) for trust indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.38: Organisational Culture					
Organisational Culture					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.855	1	12.855	150.078	.000
Within Groups	14.305	167	.086		
Total	27.160	168			

The F statistic (F = 150.078) and p-value (p = 0.000) for organisational culture indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.39: ANOVA Organisational Structure					
Organisational Structure					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.243	1	17.243	290.380	.000
Within Groups	9.917	167	.059		
Total	27.160	168			

The F statistic (F = 290.380) and p-value (p = 0.000) for organisational structure indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.40: ANOVA Privacy Risks					
Privacy Risk s					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.066	1	6.066	48.025	.000
Within Groups	21.094	167	.126		
Total	27.160	168			

The F statistic (F = 48.025) and p-value (p = 0.000) for privacy risk indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.41: ANOVA Government Support					
Government Support					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.660	1	4.660	34.586	.000
Within Groups	22.500	167	.135		
Total	27.160	168			

The F statistic (F = 34.586) and p-value (p = 0.000) for government support indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.42: ANOVA Regulatory Concerns					
Regulatory Concerns					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.280	1	16.280	249.882	.000
Within Groups	10.880	167	.065		
Total	27.160	168			

The F statistic (F = 249.882) and p-value (p = 0.000) for organisation size indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.43: ANOVA External Pressures					
External Pressures					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.111	1	12.111	134.391	.000
Within Groups	15.049	167	.090		
Total	27.160	168			

The F statistic (F = 134.391) and p-value (p = 0.000) for external pressures indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.44: ANOVA Culture					
Culture					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.740	1	9.740	93.382	.000
Within Groups	17.419	167	.104		
Total	27.160	168			

The F statistic (F = 93.382) and p-value (p = 0.000) for culture indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.45: ANOVA Industry Type					
Industry Type					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24.225	1	24.225	1378.491	.000
Within Groups	2.935	167	.018		
Total	27.160	168			

The F statistic (F = 1378.491) and p-value (p = 0.000) for industry type indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.46: ANOVA Direct Benefits					
Direct Benefits					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.243	1	17.243	290.380	.000
Within Groups	9.917	167	.059		
Total	27.160	168			

The F statistic (F = 290.380) and p-value (p = 0.000) for direct benefits indicate that the mean adoption attitude of the variable is statistically significant.

Table 5.47: ANOVA Indirect Benefits					
Indirect Benefits					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	**25.189**	**1**	**25.189**	**2134.438**	**.000**
Within Groups	**1.971**	**167**	**.012**		
Total	**27.160**	**168**			

The F statistic (F = 2134.483) and p-value (p = 0.000) for indirect benefits indicate that the mean adoption attitude of the variable is statistically significant.

In Summary, according to the analysis of variance, there are statistically significant differences in the means of attitudes towards the adoption of cloud computing within the independent variables, as previously indicated by the t-test results.

5.8 Correlations

A bivariate correlation is used to determine whether or not dependent variable and an independent variable have a linear relationship. The Pearson correlation matrix indicates that all of the independent variables have a statistically significant positive correlation, with service quality and security concerns showing a propensity for perfect multicollinearity with a correlation coefficient of 1(see Appendix D). This relationship can be evaluated further through by conducting regression analysis. With reference to attitude towards the adoption of cloud computing, the variables of cost, IT infrastructure readiness, feasibility, industry type and indirect benefits have the highest statistically significant correlation coefficients of above 0.9.

5.9 Testing the Hypotheses: Regression Analysis

H1: Service quality will have a positive and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.4441a		df	SS	MS	F	Sig. F
R Square	0.197	Regression	1.000	5.359	5.350	41.040	0.000
Adjusted R Square	0.192	Residual	167.000	21.801	0.130		
Standard Error	0.361	Total	168.000	27.160			
Observations	169.000						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.323	0.140	2.309	0.022	0.047	0.599	

Service Quality	0.839	0.131	6.407	0.000	0.580	1.097

Based on the positive value of beta (0.84) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H1 that service quality will have a positive and significant effect on cloud computing adoption. The R square implies that service quality can explain19.7% of the variation in cloud computing adoption.

H2: Usefulness will have a positive and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.310		df	SS	MS	F	Sig. F
R Square	0.096	Regression	1.000	2.614	2.614	17.787	0.000
Adjusted R Square	0.091	Residual	167.000	24.545	0.147		
Standard Error	0.383	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.364	0.201	1.811	0.072	-0.033	0.760	
Usefulness	0.818	0.194	4.217	0.000	0.435	1.201	

Based on the positive value of the beta (0.82) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H2 that usefulness will have a positive and significant effect on cloud computing adoption. The R square implies that usefulness can explain9.6% of the variation in cloud computing adoption.

H3: Security concerns will have a negative and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.444		df	SS	MS	F	Sig. F
R Square	0.197	Regression	1	5.359	5.359	41.047	0.000
Adjusted R Square	0.192	Residual	167	21.801	0.131		
Standard Error	0.361	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.323	0.140	2.309	0.022	0.047	0.599	
Security Concerns	0.839	0.131	6.407	0.000	0.580	1.097	

Based on the positive value of the beta (0.84) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H3 that security Concerns will have a positive and significant effect on cloud computing adoption. The R square implies that Security Concern can explain19.7% of the variation in cloud computing adoption. This also validates the correlation identified between service quality and Security Concern.

H4: Complexity will have a negative and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.382		df	SS	MS	F	Sig. F
R Square	0.146	Regression	1	3.970	3.970	28.586	0.000
Adjusted R Square	0.141	Residual	167	23.190	0.139		
Standard Error	0.373	Total	168	27.160			
Observations	169						

	Coefficients	*St. Error*	*t Stat*	*P-value*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.344	0.163	2.108	0.036	0.022	0.665
Complexity	0.828	0.155	5.347	0.000	0.522	1.134

Based on the positive value of the beta (0.83) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model accepts H4 that complexity will have a negative and significant effect on cloud computing adoption. The R square implies that complexity can explain 14.6% of the variation in cloud computing adoption.

H5: Cost will have a positive and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.907		df	SS	MS	F	Sig. F
R Square	0.822	Regression	1	22.338	22.338	773.734	0.000
Adjusted R Square	0.821	Residual	167	4.821	0.029		
Standard Error	0.170	Total	168	27.160			
Observations	169						

	Coefficients	*St. Error*	*t Stat*	*P-value*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.071	0.043	1.674	0.096	-0.013	0.156
Cost	0.964	0.035	27.816	0.000	0.896	1.033

Based on the positive value of the beta (0.96) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H5 that cost will have a positive and significant effect on cloud computing adoption. The R square implies that cost can explain 82.2% of the variation in cloud computing adoption.

H6: Size of organisation will have a positive and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.536		df	SS	MS	F	Sig. F
R Square	0.287	Regression	1	7.793	7.793	67.195	0.000
Adjusted R Square	0.283	Residual	167	19.367	0.116		
Standard Error	0.341	Total	168	27.159			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.570	0.081	7.000	0.000	0.409	0.730	
Organization Size	0.430	0.053	8.197	0.000	0.327	0.534	

Based on the positive value of the beta (0.43) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H6 that organisation size will have a significant effect on cloud computing adoption. The R square implies that organisation size can explain 28.7% of the variation in cloud computing adoption.

H7: IT infrastructure readiness will have a positive and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.916		df	SS	MS	F	Sig. F
R Square	0.840	Regression	1	22.801	22.800	873.538	0.000
Adjusted R Square	0.839	Residual	167	4.359	0.026		
Standard Error	0.162	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.128	0.038	3.341	0.001	0.052	0.204	
IT infrastructure	0.872	0.029	29.556	0.000	0.814	0.930	

Based on the positive value of the beta (0.87) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H7 that IT Infrastructure readiness will have a positive and significant effect on cloud computing adoption. The R square implies that IT infrastructure readiness can explain approximately 84% of the variation in cloud computing adoption.

H8: Feasibility will have a positive and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.948		df	SS	MS	F	Sig. F
R Square	0.898	Regression	1	24.403	24.403	1478.296	0.000
Adjusted R Square	0.898	Residual	167	2.757	0.017		
Standard Error	0.128	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.081	0.031	2.636	0.009	0.020	0.142	
Feasibility	0.919	0.024	38.449	0.000	0.872	0.966	

Based on the positive value of the beta (0.92) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H8 that feasibility will have a positive and significant effect on cloud computing adoption. The R square implies that feasibility can explain approximately 90% of the variation in cloud computing adoption.

H9: Trust will have a positive and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.888		df	SS	MS	F	Sig. F
R Square	0.790	Regression	1	21.415	21.415	622.544	0.000
Adjusted R Square	0.787	Residual	167	5.745	0.034		
Standard Error	0.185	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.085	0.047	1.813	0.070	-0.008	0.178	
Trust	0.960	0.038	24.951	0.000	0.882	1.033	

Based on the positive value of the beta (0.96) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H9 that trust will have a positive and significant effect on cloud computing adoption. The R square implies that trust can explain approximately 79% of the variation in cloud computing adoption.

H10: Organisational culture will have a negative and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.688		df	SS	MS	F	Sig. F
R Square	0.473	Regression	1	12.855	12.855	150.078	0.000
Adjusted R Square	0.470	Residual	167	14.305	0.086		
Standard Error	0.293	Total	168	27.160			
Observations	169						

	Coefficients	*St. Error*	*t Stat*	*P-value*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.212	0.084	2.528	0.012	0.046	0.377
Organisational Culture	0.894	0.073	12.251	0.000	0.750	1.038

Based on the positive value of the beta (0.89) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model rejects H10 that organisational culture has a negative and significant effect on cloud computing adoption. The R square implies that organisational culture can explain 47.3% of the variation in cloud computing adoption.

H11: Organisational structure will have a significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.797		df	SS	MS	F	Sig. F
R Square	0.635	Regression	1	17.243	17.243	290.380	0.000
Adjusted R Square	0.633	Residual	167	9.917	0.059		
Standard Error	0.244	Total	168	27.160			
Observations	169						

	Coefficients	*St. Error*	*t Stat*	*P-value*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.292	0.057	5.156	0.000	0.180	0.403
Organisation Structure	0.708	0.042	17.041	0.000	0.626	0.790

Based on the positive value of the beta (0.71) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H11 that organisational structure has a significant effect on cloud computing adoption. The R square implies that organisational structure can explain 63.5% of the variation in cloud computing adoption.

H12: Privacy risk will have a negative and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.797		df	SS	MS	F	Sig. F
R Square	0.635	Regression	1	17.243	17.243	290.380	0.000
Adjusted R Square	0.633	Residual	167	9.917	0.059		
Standard Error	0.244	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.292	0.057	5.156	0.000	0.180	0.403	
Organisational Structure	0.708	0.042	17.041	0.000	0.626	0.790	

Based on the positive value of the beta (0.84) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H12 that privacy risk has a negative and significant effect on cloud computing adoption. The R square implies that privacy risk can explain 22.3% of the variation in cloud computing adoption.

H13: Government support will have a positive and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.473		df	SS	MS	F	Sig. F
R Square	0.223	Regression	1	6.066	6.066	48.025	0.000
Adjusted R Square	0.219	Residual	167	21.094	0.126		
Standard Error	0.355	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.313	0.131	2.383	0.018	0.054	0.571	
Privacy risk	0.844	0.122	6.930	0.000	0.603	1.084	

Based on the positive value of the beta (0.83) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H13 that government support has a positive and significant effect on cloud computing adoption. The R square implies that government support can explain 17.2% of the variation in cloud computing adoption.

H14: Regulatory concerns will have a negative and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.774		df	SS	MS	F	Sig. F
R Square	0.599	Regression	1	16.280	16.280	249.882	0.000
Adjusted R Square	0.597	Residual	167	10.880	0.065		
Standard Error	0.255	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.320	0.059	5.414	0.000	0.203	0.437	
Regulatory Concerns	0.680	0.043	15.808	0.000	0.595	0.765	

Based on the positive value of the beta (0.68) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model rejects H14 that Regulatory Concern has a negative and significant effect on cloud computing adoption. The R square implies that Regulatory Concern can explain approximately 60% of the variation in cloud computing adoption.

H15: External pressures will have a positive and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.668		df	SS	MS	F	Sig. F
R Square	0.446	Regression	1	12.111	12.111	134.391	0.000
Adjusted R Square	0.443	Residual	167	15.049	0.090		
Standard Error	0.300	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.443	0.069	6.379	0.000	0.306	0.580	
External pressures	0.557	0.048	11.593	0.000	0.462	0.652	

Based on the positive value of the beta (0.56) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H15 that external pressures has a positive and significant effect on cloud computing adoption. The R square implies that external pressures can explain 44.6% of the variation in cloud computing adoption.

H16: Culture will have a negative and significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.668		df	SS	MS	F	Sig. F
R Square	0.446	Regression	1	12.111	12.111	134.391	0.000
Adjusted R Square	0.443	Residual	167	15.049	0.090		
Standard Error	0.300	Total	168	27.160			
Observations	169						
Coefficients		***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.443	0.069	6.379	0.000	0.306	0.580	
External pressure	0.557	0.048	11.593	0.000	0.462	0.652	

Based on the positive value of the beta (0.87) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model rejects H16 that culture has a negative and significant effect on cloud computing adoption. The R square implies that culture can explain approximately 35.9% of the variation in cloud computing adoption.

H17: Industry type will have a significant effect on cloud computing adoption.

Regression Statistics		**ANOVA**					
Multiple R	0.944		df	SS	MS	F	Sig. F
R Square	0.892	Regression	1	24.225	24.225	1378.491	0.000
Adjusted R Square	0.891	Residual	167	2.935	0.018		
Standard Error	0.133	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.043	0.033	1.325	0.187	-0.021	0.108	
Industry Type	0.978	0.026	37.128	0.000	0.926	1.030	

Based on the positive value of the beta (0.98) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H17 that industry type has a significant effect on cloud computing adoption. The R square implies that industry type can explain 89.2% of the variation in cloud computing adoption.

H18: Direct benefits will have a positive and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.797		df	SS	MS	F	Sig. F
R Square	0.635	Regression	1	17.243	17.243	290.380	0.000
Adjusted R Square	0.633	Residual	167	9.917	0.059		
Standard Error	0.244	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.292	0.57	5.156	0.000	0.180	0.403	
Direct Benefits	0.708	0.042	17.041	0.000	0.626	0.790	

Based on the positive value of the beta (0.71) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H18 that direct benefits have a positive and significant effect on cloud computing adoption. The R square implies that direct benefits can explain 63.5% of the variation in cloud computing adoption.

H19: Indirect benefits will have a positive and significant effect on cloud computing adoption.

Regression Statistics		ANOVA					
Multiple R	0.963		df	SS	MS	F	Sig. F
R Square	0.927	Regression	1	25.189	25.189	2134.438	0.000
Adjusted R Square	0.927	Residual	167	1.971	0.012		
Standard Error	0.109	Total	168	27.160			
Observations	169						
	Coefficients	***St. Error***	***t Stat***	***P-value***	***Lower 95.0%***	***Upper 95.0%***	
Intercept	0.029	0.027	1.093	0.276	-0.024	0.082	
Indirect Benefits	0.985	0.021	46.200	0.000	0.943	1.028	

Based on the positive value of the beta (0.99) as well as the p-values of the t-statistic and F-statistic at a 5% level of significance, the linear regression model confirms H19 that indirect benefits have a positive and significant effect on cloud computing adoption. The R square implies that indirect benefits can explain 92.7% of the variation in cloud computing adoption.

The regression models confirm the relationships observed in the Pearson Correlation Matrix.

5.10 Testing for Reliability

The Cronbach's alpha measure is used to determine the reliability or internal consistency of the scales used in the categorical (Parts 1 and 2) and Likert scale questions (Part 2.1) of the cloud computing adoption survey.

Table 5.48: Reliability Statistics for Part 1 and Part 2

Cronbach's Alpha	N of Items
.941	24

The value of Cronbach's alpha for Parts 1 and 2 is 0.941, which is higher than the standard threshold of 0.7. Further analysis of the individual variables shows that the deletion of most of the individual items will result in a lower a Cronbach's alpha. This implies that the scale in Part 1 and 2 has a high degree of internal consistency and is, therefore, reliable (see Appendix E).

Table 5.49: Reliability Statistics for Part 2.1

Cronbach's Alpha	N of Items
.967	20

The value of Cronbach's alpha for Parts 2.1 is 0.967, which is higher than the standard threshold of 0.7. Further analysis of the individual variables shows that the deletion of all of the individual items, apart from organisation size, will result in a lower value of Cronbach's alpha. This implies that the scale in Part 2.1 has a higher level of internal consistency when compared to that for Part 1 and 2, and is, therefore, reliable (see Appendix E).

5.11 Chapter Summary

85.80% of the respondents in the organisations studied supported the intention of adopting cloud computing while 97.63% of them perceived usefulness as the most important factor in adopting cloud computing. 95.26% of the respondents also perceived that service quality and security are very important factors in the adoption of cloud computing. The responses to the Likert Scale questions presented in the cloud computing adoption survey show that 96.7% of the respondents perceived service quality and security concern as the most important factor in adopting cloud computing. Inferential analyses indicate that the respondents who consider service quality as an important factor in the adoption of cloud computing have a statistically significantly less positive attitude towards adoption. The respondents who considered cost to be an important factor in the adoption of cloud computing had a statistically significant less positive adoption attitude when compared to those who did not consider cost of cloud computing technology as an important factor to the adoption of cloud computing, similarly, respondents who considered the size of the organisation, feasibility, direct benefit, and indirect benefit as important factors in the adoption of cloud computing also had a statistically significant more negative attitude towards adoption. Testing the hypotheses using regression analysis reveals that service quality, usefulness, security concerns, cost, the size of the organisation, IT infrastructure readiness, feasibility, trust, the structure of the organisation, privacy risk, government support, external pressures, industry type , direct benefits and indirect benefits have a positive and significant effect on cloud computing adoption. The values of Cronbach's alpha for the independent variables is higher than the standard threshold of 0.7, implying that the scale used in the study has a high level of internal consistency.

More findings and answers are going to be revealed in the next chapter in terms of how these figures will be interpreted and understood. The next chapter is prepared and designed on the outcome of this chapter. The answers to key factors that might effect on the adoption of cloud computing in Saudi Arabia are studied and discussed in the next chapter.

6 CASE STUDIES: ANALYSIS AND FINDINGS

This chapter interprets and analyses the case study findings in regards to the adoption of cloud computing in Saudi Arabia. It aims to identify the factors that might affect the adoption of cloud computing with specific reference to Saudi government, and has the purpose of helping to accelerate the process of adopting cloud computing. Interviews were the main data collection method that had been used in the case study.

The structure and analysis of the interviews were guided by the theoretical framework presented in Chapter 3 which was developed from a combination of two different IS adoption theories. These were used to design the interview questions, and analyse the data, and in the interpreting study's findings in order to overcome the risk of out-scoping data.

The main findings are presented in the following sections and as a result, are used to provide the answers to the research questions concerning the factors affecting on the adoption of cloud computing in Saudi Arabia at the organisational level.

The findings are classified into three main themes: technological factors; organisational factors; environmental factors. The findings were mapped into those themes in order to make them easier to understand and follow.

The empirical study showed that this kind of research is essential in order to understand the issues considered, and it is crucial to conduct an in-depth investigation at the workplace of an organisation. As a result, the research questions presented in Chapter 1 can be answered. At the beginning of this chapter, a brief background of the nature of the case study location is presented.

6.1 The Kingdom Of Saudi Arabia: Case Study Background

All countries have unique and different plans and visions in terms of moving to cloud computing, and therefore it was essential to consider all relevant aspects of the case study chosen in this research.

In previous chapters, all possible issues that might affect the adoption of cloud computing have been studied, although with the rapid adoption of cloud computing, there is no universal model that can be applied to all countries. There is no one solution used in one country which might fit another country. This is because each country has its specific conditions and characteristics according to its political, environmental, economical, and cultural contexts that might affect the adoption of cloud computing.

This should not prevent the experiences and experiments of other countries in this area from being utilised in order to avoid the problems that may be faced. Therefore, this chapter gives a brief background to the Kingdom of Saudi Arabia (KSA) which is the case study location for this research. Aspects such as the population, economy, geography, culture, and IT strategies and visions are highlighted.

6.1.1 The Kingdom of Saudi Arabia (KSA)

The Kingdom of Saudi Arabia is one of the largest countries in the Middle East, occupying an area of about 2,150,000 square kilometres. The population is 27 million, and Riyadh is the capital city. The male shapes 54.3% of the population and 45.7% female, and more than 50% of the population is under the age of 20.

The geography of Saudi Arabia consists of deserts, mountains, forests, and grasslands. The climate differs from area to area and temperatures can reach more than 50 degrees Celsius in some regions in the summer, while in the winter temperatures can drop below freezing in the north. Saudi Arabia has very little rainfall at about four to five inches a year.

Saudi Arabia is the world's biggest oil producer and exporter and the second largest of hydrocarbon reserves, in general. Saudi Arabia consists of thirteen provinces; divided into local governorates. Each of the total 118 governorates is formed from many sub-governorates. (Government, 2010).

6.1.2 The Political Context

Saudi Arabia is considered to be an absolute monarchy. The source of the country's constitution is the Quran (the holy book for Muslims) and the Sunnah (the prophet Muhammad's instructions) which also called "Islamic Sharia". The king combines legislative, executive, and judicial functions and is also the prime minister, and has the control over the Council of Ministers.

All Saudi men are allowed to meet the king directly through very simple and basic tribal tradition which is called by "Almajlis". By custom, the tribal heads "Sheikhs" have the right to approach the government and deliver messages from the local people. The tribes are still strong in Saudi Arabia and have an important influence. On the other hand, in the last decade the government has announced the formation of a "Shoura Council", which consists of the highly educated and senior persons participating in decision-making. Members of the "Shura Council" are selected and chosen by the King, and recently women have participated in this Council (Ash-shura, 2004).

In 1945, Saudi Arabia joined the United Nations (UN) and the Saudi Arabia has membership of the Gulf Cooperation Council, the Arab League, and the Muslim World League (Government, 2013). In 2005, the Saudi Arabia joined the World Trade Organisation (WTO) and it also plays a significant role in the International Monetary Fund and the World Bank. Also, it is a founding member of the Organisation of Petroleum Exporting Countries (OPEC), which is an international organisation that controls and sets the policy for oil pricing in order to manage the production of oil and to balance market prices.

6.1.3 The Economic Context

The economy of Saudi Arabia relies on oil, and petroleum is considered as the main source of its income. Saudi Arabia is the world's biggest oil producer and exporter and the second largest of hydrocarbon reserves. In general with about 75%-90% of budget revenues consisting of their export. The private sector represents about 40% of total GDP. Other resources found in Saudi Arabia include iron ore, gold, copper, natural gas, and other natural substances (Network, 2010).

The Saudi government is at present developing a set of plans to enhance private sector economy. Recently, a number of announcements by the government show that a wideranging economic reform effort is gradually emerging (Network, 2010). The Saudi Arabia government has announced that its budget for 2013 was $227 billion (Finance, 2013). Saudi Arabia is considered as the fastest-growing country in terms of per capita income in the world. Recently, the development of six "economic cities" has been started, which are planned to be completed by 2020. These cities are expected to enhance the economy (Network, 2010) rapidly.

6.1.4 The Culture Context

Various aspects should be taken into consideration in order to understand the culture of Saudi Arabia, such as religion, regime, tribal structure, and modernization. Saudi Arabia is the homeland and heart for all Muslims across the world. Most Saudis follow the instructions of Islam, and they are strongly influenced by the religion. The people in Saudi Arabia are by nature religious, and Islam plays a primary role in defining its culture, which acts as a primary influence in determining the traditions, obligations, and social patterns. Islam is considered to be a comprehensive system involved in every detail of Saudi life. In fact, Islam encourages all people to do the right things that are good for them to make the life much happier (Al-Saggaf, 2004). The government wishes to modernise all aspects of life in Saudi society and for this purpose has established a long-term plan to achieve its mission. Saudi Arabia is moving towards being a developed country in the near future. The other important element of Saudi culture is the tribal system, which is a very strong factor that influences the people in Saudi Arabia. This factor is important to be taken in the consideration of any future studies and actions. Given the above, Saudi Arabia's national culture is unique (Vassiliev and Vasil'ev, 2000), and influences the culture of the country's organisations, and that is important factors that are considered when adopting technology in the public sector (Hostede and Hofstede, 2004).

6.1.5 The Information and Communication Technology (ICT) Context

The government prioritises ICT due to its essential role in the economies of many nations. Saudi Arabia is considered to be the biggest market for ICT in the Middle East, and the Saudi ICT sector represents approximately 55% of the total ICT in the regional market. ICT spending has grown since 2001, to reach as a total expenditure of US$7.3 billion on ICT projects (SAGIA, 2014). ICT adoption is also increasing rapidly in the public sector, and Saudi Arabia has developed a twenty-year ICT plan that will support the adoption of technology and telecommunications across the country. As an oil producer, Saudi Arabia has unique access to energy, and this makes it an attractive location for ICT-enabled service providers such as data centres. The public sector has a excellent ICT infrastructure and can be considered ready to adopt new technologies (MCIT, 2014).

The Saudi government encourages public sector organisations to utilise information technology systems in the economy, and, as a result, most public sector organisations have invested heavily in ICT-related products (SAGIA, 2014).

However, information technology diffusion in a place like Saudi Arabia is a very critical process and involves many risks and problems. In fact, it is not often an easy step. These challenges not only concern technical issues, but also go further to other aspects such as social, political, cultural, and economic factors (Al-Sudairy, 2000).

According to Al-Turki and Tang (1998), many challenges are faced by organisations that are willing to adopt information technology, including the following:

- The absence or weakness of top management support.
- The constraints of IT budgets.
- Shortages of qualified staff.
- The lack of high-quality training for the workforce.

To conclude, Saudi Arabia has a unique environment and conditions in terms of its culture, economy, politics, and ICT readiness. Therefore, it would be nearly impossible to implement off-the-shelf solution in adopting cloud computing in the government sector without considering all of the issues raised above.

This is why the present study conducts an in-depth investigation for Saudi government organisations in order to understand the nature of any existing problems that may prevent them from adopting cloud computing. The use of case study approach provided more precise findings be helpful in understanding all aspects of the problem. In the following sections, the findings of the qualitative study are presented and analysed.

6.2 Case Study Findings

This section presents the findings of the research from the interviews that were conducted with the members of four government organisations in Saudi Arabia as described in chapter 4, in order to identify the factors affecting the adoption of cloud computing at government organisational level. The data were analysed by employing a process of thematic template analysis as described in detail in chapter 4. As mentioned earlier, the analysis of the findings relies on the theoretical models presented in (chapter 3) and in the light of this, the analysis is structured and organised, which consists of four themes that all of the findings are related to:

6.2.1 General Findings

The analysis of the data shows that all of the government organisations studied will support the adoption of cloud computing although levels of support differ. Because of the government organisations consist of civilian and military sectors and each sector showed some different concerns and issues. Members of civilian organisations exhibited the excitement about adopting cloud computing in the near future than military ones. The senior managers understood the importance of adopting cloud computing and showed an acceptable level of awareness in this regard. It is noticed that the staff of government organisations do not know who will be responsible for the adoption process in Saudi Arabia, and they are waiting for the appropriate initiatives to come from somewhere. The members of the government organisations showed very strong interest in cloud computing, but they still need more information about it and a better awareness of the importance of using this technology. Also, it was noticed that the IT managers interviewed are the most excited towards the adoption of cloud computing as they are aware of the benefits of using it. However, the government organisations in Saudi Arabia have been waiting for the ruling authority to give the necessary commands to the government leaders to start moving to cloud computing, as this how things work in Saudi Arabia in such cases. Individual initiatives are very limited with such big projects. So, it was obvious that the process will not start unless the ruling authority makes the decision. The participants interviewed were coded as shown in Table 6.1.

Table 6.1: Participants Codes

No.	Organisation Name	Type	Participant Description	Code
G1	Government Organisation	Public Sector	Senior Manager	SM1
G1	Government Organisation	Public Sector	IT Manager	IM1
G1	Government Organisation	Public Sector	IT Specialist	IS1
G1	Government Organisation	Public Sector	IT Specialist	IS2
G2	Government Organisation	Military Organisation	Senior Manager	SM2

G2	Government Organisation	Public Sector - Military	IT Manager	IM2
G2	Government Organisation	Public Sector - Military	IT Specialist	IS3
G2	Government Organisation	Public Sector - Military	IT Specialist	IS4
G3	Government Organisation	Public Sector - Military	Senior Manager	SM3
G3	Government Organisation	Public Sector - Military	IT Manager	IM3
G3	Government Organisation	Public Sector - Military	IT Specialist	IS5
G3	Government Organisation	Public Sector - Military	IT Specialist	IS6
G4	Government Organisation	Public Sector	Senior Manager	SM4
G4	Government Organisation	Public Sector	IT Manager	IM4
G4	Government Organisation	Public Sector	IT Specialist	IS7
G4	Government Organisation	Public Sector	IT Specialist	IS8

6.2.2 Organisational and Technological Themes

6.2.2.1 Quality of Service

The case study findings show that this factor requires considerable attention before adopting cloud computing in a government organisation. Extra and more detailed findings were revealed, the participants of this case study specified that the quality of service is a very important factor, but the level of importance ascribed to it differs according to the position of the participant within an organisation. The understanding concerning the importance of this factors also various. For example, senior managers see this factor as essential and one which should be given a very high priority before implementing cloud computing. One of the senior managers (SM1) in a government organisation said in his interview that*:*

> *"I think the quality of service of cloud computing is a very important issue for us and for our organisation and it is crucial that the services provided are very of high quality and standards for our employees and others. Also, it matters for us the impact of our service once we use the cloud".*

Another one (SM3) added that:

"We wish to use cloud computing in our organisation as long as the service will be provided in a suitable state and acceptable manner, of course, this will build up trust in the technology".

Meanwhile the IT managers agreed with the top management seniors to some extent and added that this issue could be controlled by applying certain standards service agreements, such as the Service Level Agreement (SLA). This is an agreement which governs the relationship between the service provider and the consumer. On the other hand, the IT specialists believed that this factor is important but should not be an obstacle to adopting cloud computing in a government organisation. As one (IM4) of them stated that:

"I think we can handle this issue very well and it would not be an issue for us at all".

To conclude the above findings, the quality of cloud computing services is seen by all levels of participants in the case study as a critical factor and the degree of importance given to it depends on the participant's job position. This factor will not be an obstacle if the SLA is considered seriously and taking this fact into consideration.

6.2.2.2 Usefulness

Based on the empirical data, the usefulness of cloud computing is considered to be one of the features that would support government organisations in deciding to adopt cloud computing. Its perceived usefulness would encourage them to use information technology in general and cloud computing, in particular.

The findings from the interviews show that the usefulness of cloud computing leads the interviewees to wish to adopt this technology as soon as possible. One of the IT managers (IM1) in a government organisation explained that:

"Surely, if we want to implement any system or application within the organisation, the first thing that we should think about it is the usefulness of that technology, otherwise we will face very strong resistance from the users".

A senior manager (SM4) also stated that:

"We stopped using some systems just because those systems were so difficult to use and manage".

In addition, the findings show that most government employees are not familiar with new technologies such as cloud computing. An IT specialist (IS6) claimed that this barrier could be overcome and stating that:

> *"We can overcome the difficulty of using cloud computing by conducting training in this particular technology, although they try always to develop user-friendly systems".*

According to the above findings, the usefulness of cloud computing services is seen by all levels of staff in all types of organisations as an important factor that would help them to adopt this technology, and any difficulties that could be overcome by providing on-going training and technical courses.

6.2.2.3 Security Concerns

The case study findings show that security concerns are the most important issue which prevents government organisations from adopting cloud computing technology. This concern considered to be the most annoying challenge for organisations. The security concerns make them hesitate about moving to the cloud computing. Security is always the highest priority for the government organisation, and they will never take the risk of it being compromised. A senior manager (SM2) emphasised this by stating that:

> *"The security of this organisation is a red line, which is not allowed to be crossed. I will not accept this technology unless I am very sure that we will be quite safe here".*

Another senior manager (SM1) reported that:

> *"I cannot imagine that our data will be kept physically in another place without ensuring that the data will be secured and safe".*

The IT managers had another point of view, and one (IM2) of them highlighted that:

> *"Yes, the security is a very important thing for us, but still we can manage it and as an IT manager I know that we can minimise the risk by utilising various security procedures, techniques, software, hardware, and other solutions".*

Another IT manager (IM3) added that:

> *"If we would want to use cloud computing services we should be ready and prepared for any surprises like attempts to be hacked".*

To this extent, an IT specialist (IS5) declared that:

> *"I am worried that our data will be exposed to the public and because of that extra pressures and responsibilities will be put on us as security technicians".*

Meanwhile, another IT specialist (IS8) disagreed and said that:

> *"I think the security of cloud computing responsibilities will be on the service providers and this will decrease our efforts".*

To conclude, security is an crucial factor for organisations in deciding to adopt cloud computing, and it has the highest priority. Moreover, this concern could be overcome by providing all necessary equipment and technical and management preparation. The findings also show that security is seen differently by each level of participants and also differs between military and civilian organisations.

On the other hand, security concerns are being seen in west differently from the Saudi context because of reasons related to cultural and political issues. The culture in Saudi Arabia effects on many aspects of dealing with technology. As mentioned above the political factors have a direct impact of handling and dealing with the security concerns. In west, the dealing with the cloud security concerns could be managed and dealt by applying the state-of-art techniques and tools to meet the security standards.

The Saudi government organisations are mainly controlled by the ruling authority that has very strict and over-concerning tends which may effect on the decision of technical opinions and advises. The political context in Saudi Arabia influences the technical solutions that could be provided. Many technical initiatives have been delayed or cancelled because of the same reason. So, any proposed solution in this matter should be presented to the Saudi authority in order to convince them to accept the solution.

6.2.2.4 Complexity

The organisations see this factor as an issue which may prevent them from adopting any technology and cloud computing, in particular. The findings revealed that the complexity of cloud computing services might discourage government organisations from moving forward to cloud computing, especially if their staff are not familiar with the new technology.

One IT manager (IM4) stated that:

> *"I believe that the complexity of any technology makes us not consider that technology."*

Another one (IM1) added that:

"In the case of the cloud computing being too complex I think we have to put some more effort into training, but if the complexity were from the user side this would be an issue".

One of the senior managers (SM3) stated that:

"If we want to adopt and support the cloud in our organisation, the technology should be easy and simple to use".

It was noticed that all interviewees levels of job position agreed that the cloud computing should not be complicated and should be user-friendly. Also, the findings show that most of the employees of these organisations do not receive any financial incentives for using these kinds of technology. This factor is considered to be important and should be taken seriously in the process of adoption.

6.2.2.5 Cost Effectiveness

Cost is a significant issue in this research, and led the Saudi government to seek alternative technical solutions in order to minimise spending on ICT.

It was agreed by the participants that applying cloud computing would minimise the government spending on ICT. The findings also show that all the participants tended to adopt the cloud computing by reporting a very good interest.

In the interviews, it was noticed that the senior managers focused on the cost of cloud computing and stated that cloud computing should be chosen because this technology would minimise expenses in an excellent manner. A senior manager (SM1) at one of the organisations said that:

"We spend a lot on IT, although the IT is not our core business, and it is not one of our organisation's missions. I definitely would use cloud technology if that will reduce down our investment in IT".

Another senior manager (SM2) also added that:

"If cloud computing will help us to manage and reduce our expenses on ICT, I will absolutely support the decision to use cloud computing technology".

Cloud computing helps organisations pay only for the services used, and the concept of "pay-as-you-go" is applied. An IT manager remarked this on saying that:

> *"Instead of starting from scratch and building a full ICT infrastructure at massive cost and effort, it is better to choose a service and pay for that service only".*

Moreover, another IT manager (IM3) stated that:

> *"I am optimistic that the adoption of cloud computing in our organisation will help us to reduce our initial and even on-going costs. We pay a lot for software licences every year for services that are not fully utilised. I am so ready to stop and cut these unnecessary costs".*

On the other hand, one IT specialist was not sure that using cloud computing would significantly reduce ICT costs. One of the IT specialists (IS4) stated that:

> *"I cannot see how cloud computing will reduce the costs on ICT".*

However, the others agreed that the cost is an important factor that would help them to use cloud computing within their organisations.

The case study findings show that cost is as one of the most significant factors affecting of cloud computing adoption in government organisations.

6.2.2.6 Organisational Size

On the basis of the findings of the case study, the size of the organisation could have either a negative or positive impact on the adoption of cloud computing. One of the senior managers (SM3) stated that:

> *"I believe that the size of the organisation may affect the adoption of cloud computing. Sometimes the size of our organisation has negatively affected some previous projects. I guess it is difficult to adopt new technologies in the case of a very large number of staff, as is the case we have, where we have faced many difficulties in terms of administrative control and staff training"*

Another senior manager (SM4) and added that:

> *"I think the size of our organisation may not help in the adoption of cloud computing, where we have more than 15000 employees situated in different branches in various areas of Saudi Arabia".*

On the other hand, one of the IT managers (IM4) believed that there is a direct relationship in this regard, where the larger size of the organisation has a negative impact on the adoption of cloud computing.

In sharp contrast, another one (IM1) argued that:

> *"My personal viewpoint is that the size of the organisation should not affect the adoption of cloud computing in government organisations, especially since the abilities in terms of financial and human resources are readily available in excellent condition".*

An IT manager (IM2) at one of the government organisations thought that the size of the organisation may have an effect on the adoption of cloud computing, but played down its importance.

Furthermore, one IT specialist (IS1) said that:

> *"We faced many troubles previously in handling a huge number of employees technically; sometimes it is very hard to serve many employees at the same time with an acceptable quality".*

To summarise, it is notable, that the size of the organisation may affect the adoption of cloud computing negatively or positively. Any obstacles could be overcome by providing administrative solutions such as HR training, changes in management, restructuring, and other improvements.

6.2.2.7 IT Infrastructure Readiness

Cloud computing technology needs a suitable IT infrastructure, regardless of whether it is located on the customer side (government organisation) or the service provider's site.

The findings show that IT infrastructure readiness is vital to the process of adopting cloud computing to both, the service provider and client sides. All interviewees at all levels of job position agreed that this is a crucial factor, and an excellent IT infrastructure must be available. They also emphasised that this factor should be given a close consideration in the process of adopting cloud computing. For instance, an IT manager (IM3) stated that:

> *"It is impossible to implement any computer system without having a ready and proper infrastructure. Beside of that, what worries me is the readiness of the IT infrastructure at the service provider level. I think the load will be on the service provider, but for us, we do not need much IT infrastructures".*

One of the senior managers (SM1) supported this idea, saying that:

> *"For me, I want to get rid of this nightmare, running my datacentre is very painful. Costly, risky. Let's get focused on our main business missions".*

One of the main objectives of adopting the cloud computing is to reduce the cost of outsourcing computing services to third-party entities and concentrating on core business. By doing that, there will be no need for any substantial IT infrastructure at the organisation, and they will need far less equipment and facilities.

One IT manager (IM4) agreed with this stating that:

> *"We pay a lot for our data centres by providing ICT infrastructure such as networking equipment, security software and hardware, maintenance tools, licensing, PC, training, communications, etc.., and so therefore I expect all of these expenses will be reduced once I go to cloud computing. From then on, I will pay for what I need. In our case, we just need three core systems like payroll, HR, and inventory".*

In summary, IT infrastructure readiness is a mandatory issue that all government organisations need. However, when these organisations decide to use cloud computing, all of their computing services will be held at the service provider. For this reason, all the load and pressure will be on the service provider, and IT infrastructure readiness will be their responsibility. The government organisation will still need a sufficiently good IT infrastructure, but on a far smaller scale compared to that of the service provider.

6.2.2.8 Feasibility

The findings show that the feasibility is an important perspective of the size and type of any project. It is essential that a comprehensive feasibility study be conducted before starting any ICT project, and adopting cloud computing in the government sector is a huge project.

The case study findings reveal that it is believed that the government must prepare a comprehensive feasibility study prior to implementing cloud computing in government organisations.

The participants showed a very strong agreement about having a feasibility study in hand before adopting the technology, in order to make sure that it would add value to their organisations. All of the senior managers at the case studies agreed, and one of them (SM4) stated that:

> *"I used to not approve any project within the organisation unless I knew if this project is feasible. As a senior manager and decision maker, I insisted on*

consulting some experts in the field to get their feedback and opinions. This matters a lot to me".

Moreover, the findings show that the IT managers in the government organisations had two different views. The first was the belief that there is no need to conduct a feasibility study; especially since the benefits of cloud computing are very obvious and well known. In contrast, the other view was that, for example (IM1):

"It is good to know if cloud computing will provide benefits to our organisations. Therefore, I prefer to conduct a feasibility study in advance".

On the other hand, the IT specialists underestimated the importance of this factor, and this is understandable since they are not at the managerial level and are not involved in such decisions.

Furthermore, the findings show that it was considered sufficient to conduct a single feasibility study for all the government organisations because they share the same services and technology.

To conclude the above findings, the feasibility study is thought by some as an important factor and this study should be conducted by the government in early stages of adopting cloud computing. The results would then be applied to the various government organisations. It is recommended that it be done by a third-party firm to avoid bias. So, it is a necessary but not mandatory.

6.2.2.9 Trust

The findings show the importance of trust between the service provider and the client (government organisations) and all other parties involved in the operation, regardless of whether trust is related to technological or administrative issues.

As a government organisation, trust is everything for the decision-makers and other members. Trust in the technology itself is crucial, as one of the senior managers (SM3) stated:

"Of course, first of all I need to trust cloud computing technology and I want to make sure this technology is trustworthy".

Another senior manager (SM2) added that:

"I cannot imagine that we will depend on other organisations to achieve our day-to-day business activities in terms of IT services and systems without

trusting that provider. That is the way the service provider of this technology should be a trusted government organisation".

Interviewees at job levels agreed that trust should exist between the stakeholders and one IT manager (IM2) stated that:

"I cannot trust any other organisation unless I have a very strong background with that provider, so I don't agree that it should be a private sector organisation and it should be a government entity".

Interviewees in the military sector paid extra attention to this factor. Military organisations care about trust because of the nature their mission. An IT manager in a military organisation emphasised the importance of trust and he pointed to that issue as concerning national security.

On the other hand, the IT specialists believed that the trust is something that it is good to have, but as long as there is an official agreement between the organisation and the service provider, this should not be an issue. One (IS6) of them stated that:

"Yes, I think trust is something good to have and it helps us to keep our relationship with the other parties at an acceptable level, but I believe that this issue could be managed by professional and official agreements. For us, as technical people, this will not affect the use of cloud computing".

Trust is therefore considered a very important issue, especially for top management and the IT managers in the government organisations. The findings show that the service provider must be a government organisation, which would be a condition for the adoption of cloud computing in government.

6.2.2.10 Organisational Culture

The findings of this case study show that the culture of an organisation significantly affects the adoption of cloud computing.

It is noticed that the senior managers and IT managers pointed to the importance of this factor for implementing any technology in government organisations. Thus, each government organisation may have some different characteristics in terms of culture, and these characteristics are affected by the type of employees, the regulations and policies of organisation, the national culture, and the type mission of organisation.

One of the senior managers (SM2) in a government organisation stated that:

> *"The culture of our organisation does not help us much in terms of accepting new ideas, new technologies, new developments, and any new unusual actions".*

Another senior manager (SM4) agreed, saying that:

> *"Sure it will have an effect, but we can increase level of awareness of our employees by conducting training and awareness workshops in order to educate them about the new technologies and the importance of these things in their life and workplace".*

In sharp contrast, another senior manager (SM3) at another government organisation revealed that:

> *"Our employees are very well educated and mature enough to accept the new technology as long as we provide them with the necessary training, and I don't think the culture of our organisation will prevent us from using cloud computing."*

Moreover, the IT managers also did not see this factor as barrier preventing government organisations from adopting cloud computing. Of course, they agreed that the culture of a government organisation has effects, but not so much as to impede the process of adopting cloud computing. The IT specialist also goes to result and supported the opinion of the IT managers.

To summarise the above findings, the culture of a government organisation may have effects on the adoption of cloud computing, but this could be controlled and managed by providing training, applying appropriate rules, and running awareness programmes.

6.2.2.11 Organisational Structure

The organisation's structure could play a positive or negative role in adopting cloud computing depending on how well the organisation structure is organised. The structure of the organisation affects positively in a proper way in case of an organisation was well organised. In contrast, if an organisation's structure and hierarchy are very complicated, then this could negatively affect the adoption of cloud computing.

A well-organised structure would help the organisation to speed up the process of adopting cloud computing because the flow of commands goes smoothly and fluidly among the departments. One senior manager (SM1) at a government organisation stated that:

"Yes, then if the structure of the organisation designed properly, I believe it would help the organisation to accomplish any task like adopting cloud computing, and the opposite is true as well".

On the other hand, an IT manager (IM3) possibly underestimated the importance of this factor when he mentioned that:

"Of course, this is an important thing, but it is not a big obstacle preventing us from adopting cloud computing. We can overcome this by forming a steering committee. The role of this committee is to take the mission as a complete project with independent management".

To conclude, the structure of an organisation plays an important role in facilitating the adoption of cloud computing but it is not an obstacle to that. The weakness of an organisation structure could be solved by considering the adoption of cloud computing as a project-based-model.

6.2.2.12 Privacy Risk

The privacy of government organisations is considered as one of the most important factors in cloud computing, and this issue may lead to hesitation to adopting it. Members of all of the case study organisations showed that this issue made them fearful of using new technologies such as cloud computing. They are afraid of being exposed to or watched by the public.

In addition, the findings reveal that the primary concern about privacy was keeping their data physically outside the organisation. One of the senior managers (SM2) said that:

"My fears about cloud computing, prevent me from accepting this technology, I do not want my data to be exposed, watched, and traced. I'm not sure how we can be safe, and our privacy as employees or organisations protected".

Moreover, another senior manager (SM3) supported this, stating that:

"It is difficult to take the risk of security being breached so that others will see our sensitive data. Our type of business and our mission is confidential and shouldn't be disclosed".

In contrast, although the IT managers agreed that privacy is very important and should be taken into consideration in government organisations, they said that all data could be encrypted and kept electronically in safer places protected by secret passwords and authentication to prevent access by others. Technically, this issue could be resolved by minimising privacy risks to acceptable levels.

One IT manager (IM1) stated that:

> *"Our duty is to protect data even if it is not kept and saved electronically in our organisation. There are many solutions to keep us safe and our privacy protected. However, the critical point for us is that the service provider should be a government organisation as we do not trust the private sector in this matter".*

On the other hand, the IT specialists agreed that the privacy of the organisation is an important issue, but they thought that this factor should not affect the adoption of cloud computing as long as data are safe and secure.

The findings also show that the participants who were managers in the military sector gave this issue very much higher priority than those in the other sectors.

To conclude, the privacy concerns should be taken seriously, and all necessary technical and administrative solutions should be provided.

6.2.3 Environmental and External Pressures Theme

6.2.3.1 Government Support

The findings from the case study showed that the support for the Saudi government for the adoption of cloud computing is one of the most important factors that would encourage government organisations to adopt it. Government support is represented by the Prime Minister and the King's influence in this direction. The Saudi government supports the use and utilisation new of technology in order to develop government performance.

Furthermore, the findings show that support from the government will accelerate and facilitate the adoption of cloud computing in the government sector. One of the senior managers (SM4) at one of the government organisations stated that:

> *"For sure, the government plays a significant role in helping us to achieve our goals by applying new technologies. It provides us with the required budget and deals with other administrative issues".*

All of the senior managers agreed that the government should support organisations in order to help them in the process of adopting cloud computing. In addition, an IT manager (IM4) stated that:

> *"From my point of view, the support of the government is an essential issue and without it . We will face many challenges that might prevent us from adopting cloud computing".*

Government support comes in many forms, such as the financial and administrative support. Another IT manger (IM3) expressed his view on this saying:

> *"Previously, we had a bad experience in implementing some projects and that was because of the lack of government support. I believe that such support will give us the required power and influence to successfully implement new projects".*

In contrast, the IT specialists were not as aware of the senior and IT managers of the importance of the support of the government. The IT specialists were more concerned about the technical issues rather than managerial issues.

To summarise, the support of the Saudi government for the national organisations is critical for the process of adopting cloud computing, in facilitating and accelerating its adoption.

6.2.3.2 Regulatory Concerns

Based on the findings from the interviews, it is considered important to have strong regulations and laws to govern all of the operations and relationships among all parties participating in the process of adopting cloud computing at the national level.

Moreover, conflicts between the service provider and the government organisations and complaints should be managed and controlled by an official and transparent regulatory system. Also, the findings show that the participants suggested that these regulations should be prepared and enacted before starting the adoption process.

One senior manager (SM1) stated that:

> *"One of our challenges that we face in the government sector is the lack of legislation and regulations. Of course, this could hinder the adoption of cloud computing. As far as I know, there are no regulations at this moment".*

Another senior manager (SM4) stated that:

> *"Unfortunately, there is a large deficiency in this respect and the government needs enact legislation for organisations in order to preserve their rights. Also, it is to avoid any future controversies or dilemmas".*

In addition, the IT managers agreed that this factor is very important and it will help government organisations to prevent conflicts in the future. Moreover, the existence of a robust regulatory system will preserve the rights of government organisations and specify the responsibilities of each party. One of the IT managers (IM2) said that:

> *"I think one of the things worrying about me is the lack of laws and regulations, and these must be clear and obligatory for all. However, we can easily prepare such legislation and can use the experience of others in this respect".*

On the other hand, although the IT specialists acknowledged the importance of this factor, they did not express the extent of the importance of this factor accurately as required, whereas senior management showed rather more concern.

In brief, this factor is very important and can encourage government organisations to speed up the adoption of cloud computing, and it will contribute to solving any issues and problems that may arise between the parties involved in this service. Suitable laws and regulations must be issued by the Saudi government who must sponsor and develop the process. Also, it should be able to follow up on issues arising and bind all parties to its provisions.

6.2.3.3 External Pressures

The findings show that there are no significant real external pressures on government organisations which are pushing them towards adopting cloud computing, since these are non-profit organisations. Such organisations are not impacted by the market or competition between businesses. The findings show that, in general, external pressures come from two sources only; the ruling authority (the royalty) and Saudi citizens, and these types of pressure are considered to be strong, but they are not willing to go further in this direction in the near past.

These pressures do not expect any direct influence on government organisations to adopt cloud computing. The government organisations try to make the life of Saudi citizens easier by providing electronic services such as e-government, and this is an initiative from the government. The ruling authority encourages government organisations to use information technology and to provide their services online for the public. Neither of the two types of pressure mentioned above has a direct influence forcing them to move to cloud computing. One senior manager (SM2) asserted that:

> *"Never, we do not have big pressure for the adoption of cloud computing, but in general we seek to apply new technologies to make it easier for citizens through the provision of electronic services".*

In the same context, another senior manager (SM3) stated that:

> *"The guidance that comes from the ruling authority constitutes high external pressure on us, but there is no special pressure to adopt cloud computing at present".*

Furthermore, an IT manager (IM4) acknowledged that:

> *"As far as I know, the external pressures are very weak and this causes organisations in the government to delay applying many new technologies such as cloud computing".*

While the IT specialists did not know if there were external pressures or not, because of the nature of their work, they keen to adopt cloud computing as fast as possible.. However, they were aware of the importance of this factor and existed to speed up the process of adopting cloud computing.

Overall, if external pressures existed it might push government organisations towards adopting cloud computing. Currently, there are significant external pressures on them. The only two potential types of pressures would come from the ruling authority and Saudi citizens, but this pressure is still weak and not forcing them to adopt cloud computing. One of the main recommendations that this raises is that the ruling authority should give the government organisations a direct command to adopt cloud computing.

6.2.3.4 Culture

The culture in Saudi Arabia has a direct effect on all aspects of life and IT, in particular. It influences organisations as well as individuals. Culture plays a significant role in the acceptance of new technologies and cloud computing, in particular.

The findings also show that the national culture in Saudi Arabia has characteristics, as discussed earlier in this chapter, which could negatively affect the adoption of cloud computing. For instance, the people are used to going physically to the offices of government organisations to accomplish their business, and they also like to have face-to-face meetings with the ministers and senior managers in order to meet their needs and requirements.

One of the senior managers (SM4) stated that:

"That is a very interesting issue, I think we are part of the culture, so we influence it and are influenced by it. The Saudi culture is a very complex matter, yes; our culture is effect on our life, our people, and our organisations".

Moreover, another senior manager (SM1) stated that:

"If we look at the Saudi culture seriously we will find that it influences many sides of our business. Most of our decisions, policies, and commands take Saudi culture in the consideration".

All of the interviewees agreed that Saudi culture could negatively affect the adoption of cloud computing. One IT manager (IM1) stated that:

"To avoid the impact of culture, we definitely need many efforts. We have faced a lot of challenges when implementing any system in our organisation. We used to conduct intensive training and awareness programme".

Furthermore, another IT manager (IM3) stated that:

"Sometimes, the habits and traditions of the employees of our organisation hinder the process of developing or applying new systems and applications, and I think the same thing will be true with the adopting of cloud computing".

To conclude, Saudi culture could have a negative effect on the adoption of cloud computing. All the participants at all job levels agreed that this could be resolved if the government organisations increased the level of IT maturity in the government sector by enhancing and providing the required training and awareness programme.

6.2.3.5 Industry Type

The findings show that the type of activity of the organisation has an effect on the adoption of cloud computing, where civilian organisations would tend to use cloud computing more than military organisations. Moreover, the military resists adopting new technologies because of security concerns. These organisations tend slightly to not fully trust new technologies and want to make sure that they are safe and reliable.

A senior manager (SM2) at one of the organisations stated that:

"Being a civilian organisation does not stop us from using or adopting any technology that we think will be useful for us. Of course, as long as cloud computing will make our business activities easier, cheaper, and smoother".

On the other hand, the military organisations tend to be more conservative towards any new technology such as cloud computing and one of their senior managers (SM1) at military organisation stated that:

> *"In general, we would like to adopt any technology that helps us and make our organisation perform better, but I do not recommend starting using these technologies so quickly. These technologies need to be tested, verified, and used in different places before we take the risk."*

In addition, an IT manager (IM1) at a military organisation stated that:

> *"Our organisation's type of mission requires us to be stricter with new technologies such as cloud computing. Sometimes, I wish that our organisation would be the leader in adopting smart and revolutionary technologies, but security concerns face us head on".*

In contrast, an IT manager (IM3) at a civilian organisation stated that:

> *"Surely, our organisation is willing to adopt cloud computing technology in order to benefit from this technology. Here, we try to stay in touch with the latest IT technologies and encourage our internal departments to switch to the digital world".*

To summarise the above findings, the civilian organisations showed more willingness and desire to adopt cloud computing comparing to the military, which prioritises security concern.

6.2.4 Perceived Benefits Theme

6.2.4.1 Direct Benefits

The findings show that the direct, clear and tangible benefits would enhance the adoption of cloud computing. The direct benefits include reducing ICT costs, increasing productivity and system availability, and reducing the organisation's environmental impact.

One of the senior managers (SM3) stated that:

> *"Without the slightest doubt, the benefits of adopting cloud computing encourage us to go far with approach. As far as I know, adopting cloud computing will in return reduce our high spending costs on IT and raise our productivity".*

In the same context, another senior manager (SM4) stated that:

"After implementing cloud computing, we expect a lot of positive sides that would help us in performing our electronic services".

The IT managers in government organisations knew exactly what the benefits of adopting cloud computing are and clearly understood how cloud computing will help them to be more efficient and productive. The IT managers agreed that cloud computing will reduce initial and on-going costs of ICT. They wanted to focus on the business mission rather than wasting their efforts and budgets on something that could be outsourced. All of these benefits have been discussed in chapter 2 in detail.

Furthermore, the IT specialists in the government organisations also realised the importance of adopting cloud computing and how this technology will dramatically help their organisations. One of the IT specialists (IS5) stated that:

"I feel that cloud computing will make our job much easier and this organisation will take real advantage of the cloud".

In general, these findings show that the direct benefits of cloud computing will encourage government organisations to adopt cloud computing. All of the participants agreed that there are many direct benefits from using cloud computing, and these benefits should be exploited.

6.2.4.2 Indirect Benefits

There are many indirect benefits of using cloud computing, although these may be intangible, therefore, difficult to measure, such as user satisfaction, quality, trust, and loyalty. These benefits also encourage government organisations to adopt cloud computing.

One of the senior managers (SM1) stated that:

"The satisfaction of Saudi citizens about the performance of the services we provide is one of our main goals. I want the Saudis to be satisfied and happy with the electronic services. I think if we use cloud computing any Saudi can access the online service easily and efficiently. In fact, this is what we are looking for".

In this context, an IT manager agreed that the indirect benefits of adopting cloud computing encourage them to use this technology, as he (IM1) stated:

"As an IT manager I totally understand the added value of using cloud computing, especially the hidden or indirect benefits that may not be noticeable to ordinary people".

On the other hand, the IT specialists were not so aware of the indirect benefits of adopting cloud computing.

The findings show that the indirect benefits will encourage government organisations to adopt cloud computing. However, the IT specialists did not understand the importance of the indirect benefits of adopting cloud computing as much as the senior and IT managers.

6.2.5 Emergence of New Factors and Issues

After conducting the interviews in the case studies, new factors emerged which were considered important from the point of view of the interviewees who participated in this study. The new factors are as follows: The awareness and business continuity.

6.2.5.1 The Awareness

The findings revealed that training and awareness programmes are very important factors. In order to overcome the impact of national cultural resistance and organisational culture, it is advised to provide training and to conduct awareness programmes.

Moreover, the answers of the participants showed that some of the obstacles that may be faced in the adoption of cloud computing could be overcome by providing training programmes to increase the maturity and the awareness of the technology. For example, one of the senior managers (SM2) stated that:

> *"We recommend that the Saudi government should conduct national and organisational awareness programmes to solve the cultural limitations and challenges."*

It was noticed that this is a very important issue in the Saudi context.

6.2.5.2 The Business Continuity

The findings of the case study revealed that cloud computing services should be continuously working for the government organisations. The business of the organisations is very critical and advised to be easily recovered. One of the IT managers (IM2) stated that:

> *"The service provider must keep the services working continuously and must prepare more than one data centre in different locations and cities in order to maximise business continuity".*

Another IT manager (IM2) added to that:

"The service provider must find solutions to keep our data in a safe place, and that it could be recovered quickly without any interruption to the service".

Moreover, a senior manager (SM4) stressed the importance of this issue, stating that:

"Anyhow, I want to make sure that our business will not be affected under any circumstances, and don't want to hear in the future that the system is down or we can't restore our data".

In summary, the cloud computing services will be provided should work continuously and any downtime must be within an acceptable and reasonable range.

6.2.6 Motivations for Adopting Cloud Computing

According to the case study findings it has been noticed that there are some motivational issues in relation to adopting cloud computing that are encouraging government organisations to adopt this technology. The findings revealed the following motivations from the government perspective:

1. Reducing costs.
2. Increasing productivity
3. Centralising services
4. Organisational Focus
5. Increasing the portability of data
6. Minimising ICT maintenance
7. Reducing the number of employees
8. Decreasing management efforts

6.3 Chapter Summary

This chapter has presented the analysis of the qualitative data collected from the interviews. It shows the main factors and issues that might face government organisation when adopting cloud computing in the near future. The study has discovered some new factors that might affect the adoption of cloud computing, which were not included in the initial conceptual framework. These factors will be added to the revised framework for the adoption the cloud computing presented in chapter 7.

All the factors and issues that have been discovered can be classified into three themes, the organisational and technological factors, environmental and external pressures, and perceived benefits. The organisational and technological theme includes twelve factors, environmental and external pressures five, and perceived benefits two factors.

The three main themes of this study have been developed and designed based on the theoretical background discussed and explained in chapter 3. Based on the empirical study and the data analysed and presented in this chapter, the findings show that these factors and issues are very important and should be considered carefully in adopting cloud computing in Saudi Arabia at the organisational level in the future.

In addition, the findings show important information and details; these valuable details were provided by key personnel in Saudi government organisations, most of whom are decision makers. Therefore, taking their input into consideration will make the move to cloud computing more possible, easier, and faster.

Furthermore, the case study findings lead to many suggestions that have been raised from the interviewees. They are extremely important in adopting the cloud computing in the Saudi government sector. This explains why a qualitative study has been conducted along with the quantitative. This kind of information would be impossible to gain by conducting only a quantitative study.

The participants in this study expressed their ideas, thoughts, feelings, fears, suggestions, and visions about adopting cloud computing. Eventually, this will lead to facilitating its adoption in the near future in an appropriate and satisfactory way.

The next chapter discusses in detail all of the findings of this study for the both the quantitative and the qualitative research. The final conceptual model will also be improved in the light of the results of research.

7 DISCUSSION AND RESEARCH SYNTHESIS

This study has used a mixed-methods sequential explanatory design which consists of two phases. The first phase was a quantitative study followed by a qualitative research as explained in chapter 4. The quantitative data were collected and analysed as shown in chapter 5, and then the qualitative data were collected and analysed as presented in chapter 6 in sequence. The second phase of qualitative research elaborated on the quantitative findings and provided more detailed. Therefore, the second qualitative phase was built on the first quantitative phase. The quantitative analysis of this phase provided a general understanding of the basic factors affecting the adoption of cloud computing. The purpose of the second phase was to refine and explain the statistical findings in more depth by soliciting the views of participants in interviews.

Chapter 2 presented a literature review and demonstrated the lack of relevant studies of the adoption of cloud computing in the government sector from the perspective of both theory and practice. Moreover, a detailed discussion was provided of the factors and issues affecting cloud computing, such as the factors concerning the organisation, technology, environment, external pressures, and perceived benefits.

Chapter 3 presented the conceptual framework of this study and, in the light of this framework, chapter 5 and 6 collected data were analysed to verify the conceptual model in order to achieve the aims of this research. This chapter synthesises the findings in the light of the relevant literature, and then refines and revises the proposed conceptual model. A practical roadmap for the adoption of the cloud computing in the Saudi government sector is then developed.

In the light of the above, the findings of the two research phases are discussed by combining the results in one rational conclusion for better understanding. The aim of this chapter to provide a sharp and clear discussion of the findings that presented in Chapter 6 and 7.

The discussion and outcomes of the chapter are identified into six main categories: general issues, organisational and technological factors, environmental and external pressures, perceived benefits, a revised model for understanding the adoption of cloud computing, and a roadmap for adopting cloud computing in the Saudi government sector.

7.1 Organisational and Technological Issues

Organisational and technological issues will have a massive influence on the adoption of cloud computing by Saudi government organisations. The key factors are discussed in the following subsections.

7.1.1 Quality of Cloud Computing Services

The findings of the quantitative data analysis in Chapter 5 revealed that this factor will have statistically significant and will have a positive effect on the adoption of cloud computing by 84%. In addition, the case study findings showed that this is an important and positive significant factor, but the level of importance ascribed differs according to the position of the participants in an organisation. The understanding of the importance of this factor is also various. For instance, senior managers see this factor as critical, and that organisations should take it into consideration and give it high priority before moving to cloud computing. Meanwhile, the IT specialists attributed less importance to this factor. This factor will is better to be seriously taken into the consideration. Preparing an SLA between the service provider and the government organisation is an important step to increase the level of the service quality and avoid any conflict. These findings echo those in the previous literature such as the studies of Grover et al. (1996), Wendy et al. (2004), Ebrahim (2005), Buyya et al. (2009), Janssen and Joha (2011), Montemayor et al. (2014)

and Klug (2014) which showed that the quality of service is a key motivating factor in the adoption of cloud computing.

7.1.2 Usefulness of Cloud Computing

This factor is statistically significant and will have a positive effect on the adoption of cloud computing by 82% and is considered to be the most important factor according to the findings presented in chapter 5. The case study data showed that the usefulness of cloud computing services is an important issue that will help government organisations to adopt cloud computing. It will affect positively toward adopting the technology. The findings also revealed that government organisations will accelerate the decision to adopt cloud computing if it is easy to use. Moreover, the government organisations revealed that this factor could be managed and controlled by conducting training so as to avoid difficulties in using cloud computing. This means the usefulness is identified as an important issue which will assist in the intention to adopt cloud computing in the future, and the service providers should treat this factor seriously. These findings confirm those of previous studies, for example the research by Davis (1989), Venkatesh et al. (2003), Jeyaraj et al. (2006), and Behrend et al. (2011), who identified usefulness as an important and motivating factor in adopting cloud computing.

7.1.3 Security Concerns about Cloud Computing Technology

The staff of government organisations identified security concerns as one of the most significant and important factors that will negatively affect by 84% on the adoption of cloud computing as presented in chapter 5 from the analysed quantitative data. Furthermore, the case study findings showed that this factor is considered as the most annoying issue, and as a result government organisations hesitate about moving to cloud technology. In addition, the senior managers in the government organisations decided that they would not take the risk of data being exposed. Based on the data collected in chapter 6, this factor is considered as the most important and significant factor comparing to all other factors, which is given the highest priority in government organisations.

The findings also revealed that no decision about adopting cloud computing will be taken unless all security concerns are resolved. The IT managers who participated in the study stated that this challenge could be overcome by using state-of-art equipment, solutions and systems and security controls. Also, it is noticed that each group of participants assessed this factor differently based on their responsibility and seniority. For example, senior managers believed that this issue is one of the challenges that will face them and they gave this issue the highest priority, while the technical staff understood this challenge and showed some flexibility of managing with it. These findings reflect and confirm these in the literature, for instance research by Jaeger and Schiffman (2010), Dillon et al. (2010), Smith (2011), Bellovin (2011), Zissis and Lekkas (2012), (Cegielski, 2012), and Montemayor et al. (2014), who presented security concerns as a barrier to the adoption of cloud computing.

7.1.4 Complexity of Cloud Computing Services

The findings from the analysis of quantitative data as presented in chapter 5 revealed that the complexity will have a significant and negative effect on the adoption of cloud computing by 83%. The analysis of the interview data in Chapter 6 showed that this factor should be given close consideration, especially in the government sector where most employees are not very familiar with new technologies. Moreover, it has been noticed that all the participants in the case study agreed that the cloud computing services must be user-friendly. One more important issue raised is that the employees of the government organisations will not receive any financial incentives or allowances for using ICT, and this will discourage them from using cloud computing services and other new technologies. On the other hand, some of the IT managers and IT specialists suggested solutions to overcome this challenge such as providing intensive training and financial support. Previous studies in the literature(Rogers (2003), Klug (2014), Chinyao et al. (2011)) have highlighted this factor and its importance as a barrier to adopting cloud computing.

Enterprise cloud computing use is expanding rapidly. Though, to produce the significant gains for cloud computing, organisations need to get serious about cloud control to evade delivering cloud invalid starts. The variety of cloud settings, tools, techniques and software is getting increasingly hard to test and maintain and that raises the complexity. Cloud has some complexity in handling the virtualisation issues, operating services, using technical features, customising software, and optimizing performance.

7.1.5 Cost Effectiveness

The quantitative data analysis showed that the cost factor is statistically significant and will have a positive effect on the adoption of cloud computing by 96%. It is considered the most important factor that will motivate government organisations to adopt cloud computing as presented in chapter 5. The case study findings revealed that reducing the cost of ICT will be a primary reason for the intention to adopt cloud computing. It is agreed that cloud computing will reduce the costs of and investments in IT infrastructure, including start-up, maintenance, and on-going costs. Moreover, the government organisations want to focus and concentrate on their missions and are willing to outsource IT services to a third-party. They would like to pay just for the services that will be used, instead of paying much money for services which will never be utilised in the future. The findings from the case study showed that top management and IT managers understand the importance of this factor, while the IT technicians prioritise to this factor less than the others. This is because the senior managers deal with budgets and the financial issues. Therefore, this factor plays a significant role as a motivator. These findings reflect those of some previous studies such as the research of Vouk (2008), Bay and Murugan (2010), Shimba (2010), and Gill (2011), who identified this as a key motivating factor towards the adoption of cloud computing.

7.1.6 Organisation Size

Organisational size will have a statistically significant impact by 43% on the adoption of cloud computing as reported in chapter 5. It is considered as the lowest effective factor that will impact on its adoption. The findings of the empirical data showed that this factor may or may not effect on the adoption. It depends on the actual size of the organisation; if the size is bigger than the organisation will face some challenges. As the data revealed, government organisations with larger numbers of branches and employees will need much investment in training and control while smaller organisations could be managed more efficiently. These findings are considered to be unique, because Saudi government organisations do not have strong regulatory system that could force their employees to use a new technology. Based on Saudi law, it is impossible to dismiss or terminate any employee because of his performance or for disobeying the orders unless a criminal offence has occurred. In addition, some recommendations have been raised by the interviewees in the study, such as staff training, changing management, and organisational restructuring.

7.1.7 IT Infrastructure Readiness

The findings from the analysis of quantitative data in chapter 5 revealed that this factor will have a significant effect positively on the adoption of cloud computing by 87%. Statistically IT infrastructure readiness is considered a critical issue, and this mirrors the case study findings in chapter 6 that emphasised having an appropriate ICT platform ahead of adopting cloud computing. Moreover, the participants in the interviews agreed on the importance of this factor and were sure that the existence of suitable IT infrastructure will increase their intention to adopt the cloud computing. This should be done from the both sides, the service provider and client side. Some concerns were shown the ability and capability of the service provider in terms of the readiness of their ICT equipment. They thought that the load and stress will be on the service provider and in this case they will focus more on their business. Furthermore, the findings showed that there must be a minimum readiness of the IT infrastructure on the organisational side so that they will be able to use the online service properly. These findings reflect those in the literature such as in the research of Lee and Thomas (2003) , Kamal (2009), Awa et al. (2012), and Lumsden (2013) who stated that this is a motivating factor towards the adoption of cloud computing.

7.1.8 Feasibility of Cloud Computing

This factor was identified statistically as a significant issue which will have a positive effect on the adoption of cloud computing by 92% as presented in chapter 5. In the same context, the findings from the analysis of the interview data in chapter 6 showed that the government organisations should conduct a feasibility study ahead of adopting cloud computing in order to determine if cloud computing will be financially and technologically feasible. Furthermore, this feasibility study is recommended to be conducted by a third-party firm to avoid any possible bias. Some of the participants such as the IT specialists underestimated the importance of this factor. In contrast, the senior managers emphasised the significance of the feasibility study. Moreover, it was found that a single feasibility study would be enough sufficient for all of the government organisations in Saudi Arabia as they share the same characteristics. The findings also revealed that the most of the participants considered to the adoption of cloud computing to be feasible, which encouraged them in leading to move to cloud computing. Therefore, this factor should be taken into consideration before government organisations decide to adopt cloud computing. Various previous studies agree that this is an important and motivating key towards the adoption of cloud computing such as Chong et al. (2009), Mousa et al. (2010), and Schubert (2011) .

7.1.9 Trust

The analysis of the data in Chapter 5 showed that trust factor in cloud computing is significant and will be positive by 96% and that this is considered to be one of the most important factors. In addition, the findings from the case study presented in Chapter 6 showed that trust should existing between all of the parties using cloud computing, in terms of people, the technology, and the organisation. The organisations in Saudi government 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 whey 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. It is clear noticed in interviewees from that all of the government organisations agreed that they would insist on dealing only with government authorities as service providers. These findings reflect those in the literature such as from the studies of Chong et al. (2009), Hofmann and Woods (2010) , and Alharbi (2012) who identified trust as a key motivating factor towards adopting cloud computing.

7.1.10 Organisational Culture

The findings from the analysis of the quantitative results in Chapter 5 showed that organisational culture could have a significant and negative impact on the adoption of cloud computing by 89%. To that extent, the findings from the case study in chapter 6 revealed that government organisations in Saudi Arabia have slightly different cultures and characteristics depending on the type of the organisation, whether civilian or military, their mission, geographical location, employee awareness, and IT maturity. The senior managers and some IT managers in the government organisation see this factor as a barrier that would prevent the organisation from adopting the cloud computing. On the other hand, while some of the IT managers agreed, they also stated that this should not be an obstacle if the government organisations made some effort to provide the awareness and training programmes. It was noticed that there were many different views on this issue. In general, it could be a potential barrier for any organisation but with less of an effect on others. Some previous studies have also highlighted this factor as an important barrier towards adopting cloud computing, such as those by Ebrahim (2005), Kamal (2006), and Momoh et al. (2010).

7.1.11 Organisational Structure

As statistically identified in as presented in chapter 5, many believed that organisational structure will have a significant effect on the adoption of cloud computing by 71%, whilst other said that it would have no impact at all by 39%. The analysis of the data gathered in the case study showed that this factor is an important issue that might affect the adoption of cloud computing in the government sector. The nature of the organisational structure could facilitate or inhibit adoption so that a proper structure will positively affect the move to cloud computing while a poor structure will negatively affect it. Some of the interviewees underestimated the significance of this factor and said that it will not be an issue at all. It was noticed that as long as an organisation is structured well, it will be readier to adopt cloud computing. These findings mirrors those in the literature, findings such as from the research of Wong (2002), Larsen et al. (2004), and Saloheimo (2005) who highlighted organisational structure as an important factor.

7.1.12 Privacy Risk

In Chapter 5, the findings showed that the privacy risk factor statistically will have a significant and negative impact on the adoption of cloud computing by 84%. As described earlier in chapter 6, this factor is considered as one of the most important which will negatively affect the adoption the cloud computing in the Saudi government sector. The government organisations fear their data being exposed to others and that their and privacy will be compromised. The other important thing is that they also would not like their activities to be monitored over or seen by any third-party organisation. Some of the interviewees also thought showed that this concern could be overcome by applying appropriate technical and legal solutions. The military sector gives this factor a higher priority than the other types of government organisation, because of the sensitivity of their missions. Moreover, participants in the case study deal with this issue differently based on their position, and level of responsibility. This factor is considered as a very important barrier towards adopting cloud computing, as also found presented in some previous studies such as those by (Ebrahim (2005), Al-shehry (2008), and Montemayor et al. (2014).

7.2 Environmental and External Pressures Factors

7.2.1 Government Support

The findings from the analysis of the quantitative data in chapter 5 revealed that this factor is statistically significant and will have a positive effect on the adoption of cloud computing by 83%. In addition, the case study findings showed that this is a very important issue and that, support from the Saudi government is essential in order to facilitate the adoption process. The Saudi government and especially the king have very a strong influence on the organisations. Any relevant decision from this side will undoubtedly positively influence the adoption of cloud computing. It has been noticed that support from the government will also help the organisations to overcome any financial limitations. On the other hand, it was also seen that the interviewees in technical positions did not understand so clearly the impact and influence of the support from the rulers and government leaders. These findings reflect those in the previous literature such as the studies of Da Rold (2009) and AlAwadhi and Morris (2009) who identified this factor as a key motivating factor.

7.2.2 Regulatory Concerns

Regulatory concerns factor will have a statistically significant and negative impact by 68% on the adoption of cloud computing as reported in chapter 5. However, the findings from the case study revealed that this factor is much more significant than the results of the quantitative analysis suggest. As presented in Chapter 6, concerns in this regards will prevent government organisations from adopting the cloud computing in the near future. The interviewees from the government organisations emphasised that clear and robust regulation and policies governing the whole process of cloud computing use were necessary. Moreover, these policies, regulations, and standards should be prepared and put in force before the adoption process starts. The senior management see this factor as very important factor and it will affect negatively on the adoption of cloud computing but the IT managers perhaps underestimate the importance of this issue and do not consider it as a barrier. In addition, the laws and regulations should be issued by the Saudi government and should bind all parties to its provisions. These findings echo those in the literature, findings such as in the research of Mousa et al. (2010), Cubitt et al. (2011), and Janssen and Joha (2011) who highlighted regulatory concerns as a potential barrier.

7.2.3 External Pressures

The findings presented in chapter 5 revealed that external pressures will have a statistically significant and positive effect on the adoption of cloud computing by 56%. Also, as presented in chapter 6, the external pressures come from two sources only, the ruling authority and citizens. These pressures are not considered to be very strong, as these organisations are non-profit organisations so that competition and market demands and pressures do not exist. The types of pressures mentioned will not be the only motivating reasons for the adoption of cloud computing, and the main external pressure is the wish of the Saudi government to make the traditional transactions among the Saudi people easier and more electronically. The findings showed that the Saudi ruling authority should put some pressure on government organisations to move to cloud computing as soon as possible. Some previous studies have also highlighted this factor as an important motivating key factor towards adopting the cloud computing, such as those by Grandon and Pearson (2004), Kamal (2006), Li (2008), and Lin and Lin (2008).

7.2.4 Culture

The findings of the quantitative data analysis in Chapter 5 revealed that this factor is statistically significant and will have a negative effect on the adoption of cloud computing by 87%. The culture in Saudi Arabia has both direct and indirect impacts on all aspects of life and can negatively affect the adoption of new technologies such as cloud computing. The findings also revealed that the national culture in Saudi Arabia has unique characteristics as discussed in chapter 6. The findings showed that the most people prefer to use the traditional methods to contact government organisation. This is a very complicated and challenging issue that might prevent government organisations from adopting cloud computing. Furthermore, the government organisations have faced many problems in this regard since the resistance to accepting new technologies is very high. To overcome these challenges, the findings revealed that the organisations should provide national programmes and awareness activities to reduce this resistance. These findings reflect those in the literature such as in the research of Allen et al. (2002), Kamal (2006), and Jiunn-Woei et al. (2014), which highlighted culture as a barrier to the adoption of cloud computing.

7.2.5 Industry Type

As statistically identified in chapter 5, industry type will have a significant effect on the adoption of cloud computing by 98%. The qualitative data findings showed that civilian organisations would tend to use cloud computing more readily than military organisations whom they do not fully trust the new technologies because of many of the concerns mentioned earlier in this chapter. Furthermore, civilian government organisations showed more desire to adopt cloud computing. They have well-educated staff and are willing to try and use new technologies such as cloud computing. In contrast, the military organisations are more conservative towards adopting cloud computing. These findings reflects those in the literature such as from the research of Jeyaraj et al. (2006), Lee et al. (2010) , and Jiunn-Woei et al. (2014) who highlighted industry type as an important issue.

7.3 The Perceived Benefits

7.3.1 Direct Benefits

In Chapter 5, the findings showed that direct benefits will have a statistically significant and positive effect on the adoption of cloud computing by 71%. It has been noticed that the direct benefits will encourage government organisations to adopt the cloud computing. This will lead to reducing the costs of ICT, increasing productivity and system availability and many other advantages mentioned in chapter 2. The findings revealed that the government organisations expect that by using cloud computing, initial and on-going ICT costs will be dramatically reduced. Also, the number of staffs required will also be reduced. Senior management clearly understands the benefits that will be gained from adopting cloud computing in their organisations, but the IT specialists could not perceive exactly what the direct benefits would be. Some previous studies have also highlighted this factor as an important and a key motivating in adopting cloud computing, such as those by (Kuan and Chau, 2001) and (Thiesse et al., 2011).

7.3.2 Indirect Benefits

The findings of the quantitative analysis in Chapter 5 showed that indirect benefits will have a significant and positive impact on the adoption of cloud computing by 99%. These benefits usually are difficult to measure, and include the satisfaction, loyalty, motivation, and other intangible phenomena. These benefits will encourage the government organisation to adopt cloud computing. Senior management and IT managers understood the expected indirect benefits that will follow from using the cloud computing. In contrast, the IT specialists were not so aware of these benefits. These findings reflect those in the literature such as in the research of Kuan and Chau (2001) and Teo et al. (2009) that highlighted the indirect benefits as a key motivating factor.

7.4 Revised Model for Adopting Cloud Computing

After conducting the quantitative and qualitative data analysis as presented in chapter 5 and 6, a revised conceptual model is presented next. The revised model takes into account the new factors that have been discovered which have an influence on the adoption of cloud computing. The aim of this revised model is to frame and indicate the key factors and their context for better understanding of the nature of the problem in a more comprehensive way, as shown in Figure 7.1.

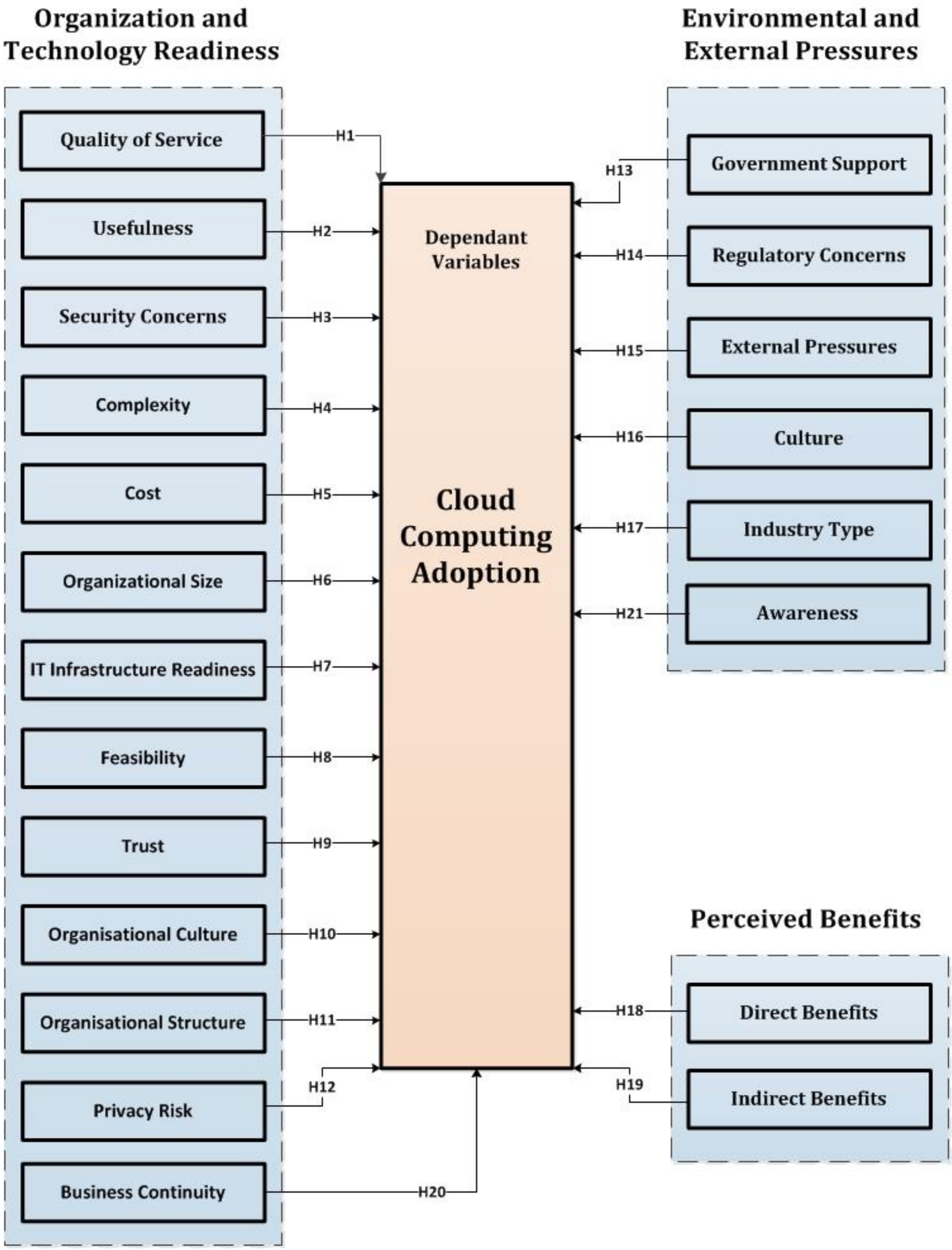


Figure 7.1: A revised conceptual model of the adoption of cloud computing

7.5 Proposed Roadmap for Adopting Cloud Computing in the Saudi Government Sector

One of the weaknesses noticed in previous studies in the literature was the lack of practical solutions for adopting cloud computing in the government sector, as described in chapter 2. There is a gap between the theory and practice, and therefore the aim of this section is to develop a practical roadmap that will guide the government organisations in Saudi Arabia into practically move to the cloud in the light of the findings of this study. So, the proposed roadmap is prepared in order to bridge the gap in the academy and industry as well. The roadmap consists of several phases, and each phase includes practical steps.

The proposed roadmap shown in Figure 7.2 is designed in the light of the study findings and based on the outcomes of the whole research. This roadmap might help the government organisations in Saudi Arabia to implement and stat using the cloud computing technology. It provides a step-by-step guidance which facilitate the process of adopting the cloud computing.

The purpose of designing the practical roadmap is to bridge the gap between the theory and practice. The government organisations tend to understand the tangible solutions rather that interpreting theoretical concepts.

Therefore, this study started with giving a strong theoretical background of the problem then suggested a theoretical model and ate the end provided a doable process to move to the cloud in Saudi Arabia.

Figure 7.2: Proposed Roadmap for Adopting Cloud Computing in the Saudi Government Sector

7.6 Chapter Summary

This chapter discusses the findings of the quantitative and qualitative phases of the study and combines them to provide a detailed understanding of the factors that affect the adoption of cloud computing deeply and concisely. Moreover, the case study findings led to new factors such as awareness and business continuity being introduced. As a result, a revised conceptual model is presented in this chapter as shown in Figure 7.3. The chapter has outlined the technological, organisational, and environmental factors that affect the Saudi government organisations in adopting cloud computing. Furthermore, in the light of the findings of this research, a practical roadmap is proposed to guide government organisations in adopting the cloud computing as shown in Figure 7.4.

8 Conclusions and Further Work

This chapter highlights the conclusions to this thesis and provides an overview of the research. Furthermore, it restates the research aims, objectives, and questions and explains how this study tried to fulfil them. In addition, it presents a discussion of the research contributions that the study has made on the subject of the adoption of cloud computing in the government sector. Finally, this chapter highlights the limitations that of this study and makes some recommendations for further work.

8.1 Research Overview

Cloud computing technology is relatively new in the field of Information Technology (IT) and many big businesses with large IT infrastructures and systems have not been able to take advantage of this technology because of various technological, cultural, and organisational problems. Those have to be solved by conducting research that analyses the challenges faced in the adoption of cloud computing technology in the public sector organisations (McKinsey and Co., 2009). One of the major issues being faced by large government organisations is the spending of vast sums on IT infrastructure. The future of computing lies in cloud computing technology, where the primary objective is to reduce IT costs while increasing productivity, availability, reliability, and flexibility and minimising response times (Brian 2008). With the help of cloud computing, organisations can concentrate more on their core business, which is very beneficial for all types of business.

A study conducted by Gartner (Mc Donald and Aron, 2013) shows that in 2013 IT executives of global companies considered cloud computing technology to be one of the top five most valuable technologies. This technology is being used by the small and medium sized firms because it provides them with easy access to IT-related resources, and it is also quite affordable. The problems faced in the adoption of cloud computing technology by big companies, and organisations are not the same, however, like those faced by small and medium-sized companies (Kim et al., 2009).

This thesis describes a comprehensive investigation conducted to help government organisation to realise the reasons for not yet adopting cloud computing and to guide them towards a better and more efficient adoption. Not much research has been conducted to examine the factors which affect the intentions of government organisations in Saudi Arabia and other developing countries. The present study aimed to provide a better understanding of the nature of the problems involved and to provide a practical guide that may lead to adopting the cloud computing in the near future in the Saudi government sector, as explained in chapter 1.

The study used a multiple case study approach to include various types of Saudi government organisations. The research has conducted done in phases to collect the required data, and quantitative and qualitative methods were used in order to enrich and enhance the quality and diversity of the research outcomes (see Chapter 4). The following paragraphs present short overviews of each chapter of the thesis:

In Chapter 1 the research problem was defined and also the significance of this study was explained. In addition, the research questions, aims, and objectives were also explicitly stated. Finally, the chapter explained how the thesis is structured and organised.

Chapter 2 discussed the findings from the literature survey and identified the factors that affect the adoption of cloud computing. Also, it identified the gaps in knowledge that are present in the literature. Moreover, it analysed the theoretical background of this problem in the light of previous relevant studies.

Chapter 3 presented a review of the literature in order to create an appropriate conceptual framework which includes the TOE framework and that presented by Iacovou et al. (1995). This led to the proposal of a conceptual model of the adoption of cloud computing in Saudi Arabia. This model was the theoretical basis of this study, and the hypotheses of this study were then discussed in detail.

Chapter 4 discussed the research methods that were selected, and how aims and objectives of the research study were to be achieved with the help of the methods, philosophies and approaches chosen. Also, it explained how the data were collected and analysed. Moreover, a detailed justification was given of all of the methods, approaches, techniques, and tools are used.

Chapter 5 presented and analysed the quantitative data that were collected from the questionnaires. It also, presented all the statistical findings of this phase of the study. The results were mapped and classified for each factor affecting the adoption of cloud computing. The aim of this chapter was to identify the statistical significance of each factor and to measure them. The quantitative analysis of the data was extended from descriptive and one-way frequency statistics to inferential and regression analysis.

Chapter 6 presented the findings of the analysis of qualitative data that were collected from the interviews. Also, it showed the main factors and issues that might face government organisation when adopting cloud computing in the near future. All of the factors and issues that have been discovered are classified into three themes: organisational and technological factors, environment and external pressures, and perceived benefits. The organisational and technological theme has twelve factors, and the environmental and external pressures have five factors, and the perceived benefits have two factors. The three main themes of this study have been developed based on the theoretical background that discussed and explored in chapter 3. Based on the empirical study, the findings presented showed that these factors and issues are very important and should be carefully considered in adopting cloud computing in Saudi Arabia at the government level in the near future.

Chapter 7 presented a discussion of the findings of the two phases of the research. This study used a mixed-method, sequential explanatory design which consists of two phases. The first phase was a quantitative study followed by qualitative research as explained in chapter 4. The quantitative data were collected and analysed as shown in chapter 5, and then the qualitative data were collected and analysed as presented in chapter 6. The second phase elaborated on the quantitative results and explained them in more detail. Therefore, the qualitative phase of the study was built on the first quantitative phase. The quantitative analysis provided on general understanding of the basic important factors affecting the adoption of cloud computing. The purpose of the second phase was to refine and explain the statistical results and findings in more depth by soliciting the views of the participants in the interviews.

For better understanding of the flow of this thesis, chapter 2 presented a literature review which demonstrated the absence of relevant theoretical and practical studies of the adoption of cloud computing from the perspective of the theory and practise in the government sector. Moreover, a depth understanding of the factors and issues affecting the cloud computing, such as the organisation, technological, environmental, external pressures, and perceived benefits. Chapter 3 presented the conceptual model of this study and in the light of this model, in chapter 5 and 6 the data were tested and the conceptual model verified in order to achieve the aims of this research. Therefore, as a result, this chapter synthesised the findings with those in the literature, and then refined and revised the proposed conceptual model.

Moreover, chapter developed a practical roadmap for the adoption of cloud computing in the Saudi government sector, having integrated the findings of the two phases. The aim of this chapter was to provide a clear discussion of the findings presented in Chapters 6 and 7.

Chapter 8 then presents conclusions of this thesis and provides an overview of the research.

8.2 Fulfilling the Aims, and Objectives of this Study

In order to achieve the research aims and objective, three questions were identified as stated in chapter 1. The research first question asked what are the factors that may affect the government organisations in Saudi Arabia in adopting cloud computing. This question was addressed by providing a critical and comprehensive literature review as discussed in chapters 2 and 3. Nineteen factors were identified and explained in detail as potential factors that may affect the adoption of cloud computing in the government sector. As a result, the hypotheses of this research were designed and tested. These factors were also examined by conducting a questionnaire-based survey (see chapter 2 and 3). The second research question asked why the cloud computing has not yet been adopted in Saudi government organisations. This question was addressed by conducting a case study in the Saudi government sector, which interviews with key employees of Saudi government organisations. As a result, valuable findings emerged to answer this question. All of the possible reasons behind not yet adopting cloud computing were identified (see chapters 2, 6, and 7). The third question asked how government organisations in Saudi Arabia will be able to adopt cloud computing in the near future. This question was addressed using the rich findings from the qualitative data analysis, as well as by utilising successful stories of best practise in the industrial world (see chapter 6 and 7).

8.3 Research Contribution

This study is one of the very few studies that have been which investigates the government sector in Saudi Arabia. Four critical and sensitive government organisations were approached, and this is a considerable achievement. The Saudi authorities supported this study by granting access to these organisations, as they consider the research as a crucial national project. As explained earlier, government organisations in Saudi Arabia have particular characteristics, and therefore it was essential to understand the problem from their perspective because solutions and recommendation from other countries may not work there.

In this context, the general outcomes of this study have contributed and extended knowledge in the field of the adoption of cloud computing in the government sector. The specific contributions of this thesis are as follows:

Contribution No.1: A comprehensive survey of literature has led to the identification of factors that may affect the adoption of cloud computing. This comprehensive review, which enriches existing knowledge in this area, proposed nineteen factors to be included in this investigation.

Contribution No.2: The absence of a theoretical model which can be used to understand the factors which influence and challenge the adoption of cloud computing was identified in chapter 1, and to bridge this gap, the study presented in chapter 3 a conceptual model for a better understanding of the factors affecting the adoption of cloud computing. This model forms the theoretical basis of this study and in the light of this model the questionnaire survey and interview questions were developed. The proposed model was analysed and tested in chapters 5 and 6. Then, based on the survey and case study findings a revised model was proposed in Chapter 7.

Contribution No.3: The revised model also enriches the understanding of the nature of problems in the adoption of cloud computing and classifies the factors involved, as presented in Chapter 7. The model categorises the issues that may affect the adoption of cloud computing into three themes: the organisational and technological context; which explores the technological and organisational boundaries that have all potential factors that may effect on the adoption of cloud computing; the environmental influences and external pressures context; which identify the potential factors that may effect on the adoption; the perceived benefits context which contains the direct and indirect benefits of using cloud computing. After the analysis of the results from Chapters 5 and 6, some new factors were discovered and added to this model.

Contribution No.4: The study has developed a practical roadmap to guide government organisations in adopting the cloud computing in an effective way, as presented in chapter 7. This contribution helps to bridge the gap between theory and practice, and the government sector sorely needs a practical roadmap. These organisations need an easy step-by-step and feasible solution. The proposed roadmap will help organisations move to cloud computing more quickly and confidently.

8.4 Research Limitation

This study has two particular limitations. The first was that the interviews were conducted and recorded in Arabic, and after that had been translated into English, this led to some misleading information and lost the sense of the sentences. This second limitation is that the proposed roadmap needs to be verified and tested after application in the real world, which will take a long period of time and could represent a basis for further work in the future.

8.5 Future Work and Recommendations

The proposed practical model is adopted and applied within the government sector, its ability to help organisations move to cloud computing can be tested and verified. The following recommendations for government organisation and researchers are suggested:

- It is strongly recommended that the ruling authorities in Saudi Arabia decide to start a national project for this purpose, and all the government organisation will participate in it within a fixed time-frame. This national project is recommended to be supervised by the Ministry of Interior and the roadmap proposed in this study will provide guidance for this project.
- The government organisations are encouraged to take the findings of this study into consideration before deciding to use cloud computing.
- The Saudi authorities are actively encouraged to put pressure on and to use their influence to persuade government organisation to think seriously about moving to cloud computing as soon as possible.
- The Ministry of Interior is encouraged to play a key role and to adopt an initiative to move to cloud computing, as it is the most trusted entity among the other organisations. This would help to overcome security and privacy concerns.
- The Ministry of Communication and Information Technology is recommended to identify a practical and feasible solution in this regard. Also, it should provide a national awareness programme for government organisations and should play the role as technical advisor to the other organisations.
- The Ministry of Finance is recommended to fund the required budget for this project.

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APPENDIX A: SURVEY

Note:This a translation of the online Arabic questionnaire

"Cloud Computing Adoption Survey Cover Statement"

The Objective of this study is to investigate adoption of Cloud computing in Saudi government organisations. I wish to identify the critical factor that influences your adoption of Cloud computing technology. It would be great help to participate in this survey and we are so appreciating.

Your valuable answers will strongly help your organisation to speed up the adoption of Cloud computing technology and contribute to gain the benefits of the technology. We would like to draw your attention that there is no personal information is needed in this survey and this survey is absolutely is a voluntary. Be sure that all information will be kept destroyed after entering into the system. This data will be used in the study as summery statistics and numbers in order to help the Saudi organisation to adopt the Cloud computing technology and will never be used to another purpose. All provide data will be used strictly by the researcher only.

Thank you very much for your corporation.

Sincerely,

The researcher Name: Majed Alsanea

Part 1: Personal information (about the respondent):

1.1 The name of your organisation is ....

1.2 Your job title in the organisation:

☐ IT Director ☐ Strategic Leader (Top management decision Maker)

☐ Other, please specify ………………………………

1.3 What is the education level?

☐ PhD degree ☐ Master degree ☐ Bachelor degree

☐ Other, please specify…………………………………………

1.4 What is the sector of your organisation?

☐ Civilian Organisation ☐ Military Organisation ☐ Health Organisation

☐ Education Organisation ☐ Independent

☐Other, please specify…………………………………………

1.5 What is the number of employees in your organisation?

☐ Less than 500 ☐ 500-1000 ☐ 1000-5000 ☐ More than 5000

Part 2. Cloud computing adoption in general: *(for T-test)*

Please tick (✓) under Yes or No

Statements	**Yes**	**No**
2.1 Do you agree that the service quality is an important to adopt Cloud computing in your organisation?		
2.2 Do you agree that the usefulness will be an important to adopt Cloud		

computing in your organisation?		
2.3 Do you agree that the security concerns will be an important factor to adopt Cloud computing in your organisation?		
2.4 Do you agree that the complexity will be an important factor to adopt Cloud computing in your organisation?		
2.5 Do you agree that the cost effectiveness will be an important factor in order to adopt Cloud computing in your organisation?		
2.6 Do you agree that the size of the organisation will be an important factor in order to adopt Cloud computing in your organisation?		
2.7 Do you agree that the IT infrastructure readiness will be an important factor in order to adopt Cloud computing in your organisation?		
2.8 Do you agree that the feasibility will be an important factor in order to adopt Cloud computing in your organisation?		
2.9 Do you agree that the trust will be an important factor in order to adopt Cloud computing in your organisation?		
2.10 Do you agree that the organisation culture will be an important factor in order to adopt Cloud computing in your organisation?		
2.11 Do you agree that the organisation structure will be an important factor in order to adopt Cloud computing in your organisation?		
2.12 Do you agree that the privacy risk is important factor in order to adopt Cloud computing in your organisation?		
2.13 Do you agree that the government support is important factor in order to adopt Cloud computing in your organisation?		
2.14 Do you agree that the regulatory concern is important factor in order to adopt Cloud computing in your organisation?		
2.15 Do you agree that the external pressure is important factor in order to adopt Cloud computing in your organisation?		

2.16 Do you agree that the culture is important factor in order to adopt Cloud computing in your organisation?		
2.17 Do you agree that the industry type is important factor in order to adopt Cloud computing in your organisation?		
2.18 Do you agree that the direct benefit is important factor in order to adopt Cloud computing in your organisation?		
2.19 Do you agree that the indirect benefit is important factor in order to adopt Cloud computing in your organisation?		
2.20 Do you think there is another factor that should be included to help the organisations to adopt the Cloud Computing technology? If Yes, please specify ………………………………………………………..		

Part 2.1. Service Quality

This part aims to identify the factor **Service Quality** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Service quality is critical issue that helps the organisation to utilize Cloud Computing technology					
2. Cloud Computing technology is an important component in enabling our IT service delivery					

Part 2.2. Usefulness

This part aims to identify the factor **Usefulness of Cloud Computing** to support the Cloud computing adoption

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Usefulness of Cloud Computing technology will help and accelerate the adoption of Cloud Computing within your organisation					
2. You think the Cloud Computing technology will help your organisation to achieve the IT objectives in proper way					

Part 2.3. Security Concern

This part aims to identify the factor **Security Concern** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
1. Security concern is very essential in order to adopt Cloud Computing technology within your organisation					
2. You think that Cloud Computing technology is not enough secured and that might make your organisation exposed					
3. You fully trust the Cloud Computing technology and you don't have any security concerns					

Part 2.4. Complexity

This part aims to identify the factor **Complexity** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1.Cloud Computing technology is complex for your organisation					
2. Cloud Computing is difficult to be used but still is manageable					

Part 2.5. Cost

This part aims to identify the factor **Cost** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1.Cloud Computing technology is very costly					
2. Cloud Computing technology helps your organisation to minimize the cost and manage the required services					
3. You think the cost is very essential to decide adopting the Cloud Computing technology at your organisation					

Part 2.6. Organisation Size

This part aims to identify the factor **Organisation Size** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
1.You think the size of your organisation influences the adoption of Cloud Computing technology					

Part 2.7. IT Infrastructure Readiness

This part aims to identify the factor **IT Infrastructure Readiness** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
1.IT infrastructure is very essential in order to adopt Cloud Computing					

2. Your IT infrastructure at your organisation is ready to adopt Cloud Computing technology					

Part 2.8. Feasibility

This part aims to identify the factor **Feasibility** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
Cloud Computing technology adoption at your organisation will be feasible and beneficial					
You think your organisation will reduce the cost and maximize the benefit by adopting Cloud Computing technology					

Part 2.9. Trust

This part aims to identify the factor **Trust** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
You trust the Cloud Computing technology and believe that it is a well-reliable technology					
You think the trust of Cloud Computing technology will help your organisation to adopt it					

Part 2.10. Organisation Culture

This part aims to identify the factor **Organisation Culture** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Your organisation Culture helps to adopt the Cloud Computing technology					
The culture of your organisation does not effect on willing of adoption Cloud Computing technology					
Your organisation faces some obstacles in terms of organisation culture					

Part 2.11. Organisation Structure

This part aims to measure the effect of the factor "**well-organized structure"** on the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
Your organisation structure does not help to adopt the Cloud Computing technology					
The well-organized organisation leads to adopt Cloud Computing technology in a proper way					
You think your organisation is not ready yet for adopting Cloud Computing technology because of the nature of your organisation structure					

Part 2.12. Privacy Risk

This part aims to identify the factor **Privacy Risk** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Cloud Computing technology will threat your organisation privacy					
You think privacy is not an major issue that prevents your organisation from adoption the Cloud Computing technology					

Part 2.13. Government Support

This part aims to identify the factor **Government Support** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Your organisation does not need the government support in order to adopt the Cloud Computing technology					
You think the government support is enough to encourage your organisation to adopt the Cloud Computing technology					

Part 2.14. Regulatory Concern

This part aims to identify the factor **Regulatory Concern** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
You think there is a real lack of regulatory in terms of Cloud Computing technology					
The regulatory concern stops you from adopting Cloud Computing technology					

Part 2.15. External Pressure (e.g. market competition, regulations, etc.)

This part aims to identify the factor **External Pressure** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

The external pressure forces your organisation to decide to go with Cloud Computing technology					
You think the external pressure will help your organisation to adopt Cloud Computing technology					

Part 2.16. A Culture

This part aims to identify the factor **Culture** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
The culture influences on the decision makers at your organisation to adopt Cloud Computing technology					
You think the culture will not affect the organisation to adopt the Cloud Computing technology					

Part 2.17. Industry Type

This part aims to identify the factor **Industry Type** to support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The industry type of an organisation influences on adopting Cloud Computing technology					
The type of industry contributes in increasing the need of adopting Cloud Computing technology					

Part 2.18. Direct Benefits - measurable (e.g. employees' performance, productivity, etc.)

This part aims to identify the factor **Direct Benefits to** support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Adopting Cloud Computing technology will let the organisation gain direct benefits					
The direct benefits of adopting Cloud Computing technology is very important tangible values to					

your organisation					

Part 2.19. Indirect Benefits – "non-measurable" (e.g. customer satisfaction, loyalty, etc.)

This part aims to identify the factor **Indirect Benefits to** support the Cloud computing adoption.

Please tick (√) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
Adopting Cloud Computing technology will let the organisation gain indirect benefits					
The indirect benefits of adopting Cloud Computing technology is very important intangible values to your organisation					

End of questionnaire. Thank you very much.

APPENDIX B: STATISTICAL ANALYSIS OUTPUT

Table 1: Coding Template for the Personal Information section of the Cloud Computing Adoption survey

Code	1	2	3	4	5	6
Job Title	IT Director	Strategic Leader	IT Team Member	IT Consulta	IT Expe	Professor/ Academic

				nt	rt	
Education Level	PhD Degree	Master's Degree	Bachelor's Degree			
Organisational Sector	Civilian Organisation	Military Organisation	Education Organisation	Independent		
Number of Employees	Less than 500	500-1000	1000-5000	More than 5000		

Table 2: The Frequencies and Descriptive Statistics of the Psychometric Evaluation of Cloud Computing Adoption

Statistics

		Adoption Attitude	Service Quality	Usefulness	Security Concern	Complexity	Cost	Organisation Size	IT Infrastructure Readiness	Feasibility	Trust
N	Valid	169	169	169	169	169	169	169	169	169	169
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		4.36	4.09	4.12	4.14	4.21	4.17	3.40	4.05	3.91	3.85
Mode		4	4	4	4	4	4	5	4	4	4
Std. Deviation		.560	.491	.498	.675	.619	.737	1.608	.965	.823	.713

Skewness	-.538	-1.306	-1.224	-1.352	-1.544	-1.445	-.136	-1.474	-1.392	-2.274
Std. Error of Skewness	.187	.187	.187	.187	.187	.187	.187	.187	.187	.187
Kurtosis	1.820	11.129	10.640	5.194	7.964	3.716	-1.777	2.128	2.335	6.347
Std. Error of Kurtosis	.371	.371	.371	.371	.371	.371	.371	.371	.371	.371
Range	3	4	4	4	4	4	4	4	4	4

		Organisation Culture	Organisation Structure	Privacy risk	Government Support	Regulatory Concern	External pressure	Culture	Industry Type	Direct Benefits	Indirect Benefits
N	Valid	169	169	169	169	169	169	169	169	169	169
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		4.24	3.82	4.41	4.54	3.81	3.55	4.41	3.85	3.86	3.88
Mode		4	4	4	5	4	4	5	4	4	4

Std. Deviation	.695	.769	.659	.636	.963	1.170	.767	.836	1.063	.858
Skewness	-1.337	-2.138	-1.319	-1.479	-1.228	-1.252	-1.890	-1.635	-1.349	-1.659
Std. Error of Skewness	.187	.187	.187	.187	.187	.187	.187	.187	.187	.187
Kurtosis	3.995	5.038	3.015	2.845	1.171	.479	5.121	3.320	1.357	3.476
Std. Error of Kurtosis	.371	.371	.371	.371	.371	.371	.371	.371	.371	.371
Range	4	4	3	3	4	4	4	4	4	4

Appendix B

Group Tables of the T-Tests Results

Service Quality Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	9.342	.003	-6.407	167	.000	-.839	.131	-1.097	-.580
	Equal variances not assumed			-28.823	160.000	.000	-.839	.029	-.896	-.781

Usefulness Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	5.808	.017	-4.217	167	.000	-.818	.194	-1.201	-.435
	Equal variances not assumed			-27.166	164.000	.000	-.818	.030	-.878	-.759

Security Concern Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	9.342	.003	-6.407	167	.000	-.839	.131	-1.097	-.580
	Equal variances not assumed			-28.823	160.000	.000	-.839	.029	-.896	-.781

Complexity Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Adoption Attitude	Equal variances assumed	7.830	.006	-5.347	167	.000	-.828	.155	-1.134	-.522
	Equal variances not assumed			-27.948	162.000	.000	-.828	.030	-.887	-.770

Cost Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Adoption Attitude	Equal variances assumed	4.578	.034	-27.816	167	.000	-.964	.035	-1.033	-.896
	Equal variances not assumed			-61.262	139.000	.000	-.964	.016	-.995	-.933

Organisation Size Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	4498.196	.000	-8.197	167	.000	-.430	.053	-.534	-.327

Organisation Size Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	4498.196	.000	-8.197	167	.000	-.430	.053	-.534	-.327
	Equal variances not assumed			-7.677	78.000	.000	-.430	.056	-.542	-.319

IT Infrastructure Readiness Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	103.869	.000	-29.556	167	.000	-.872	.029	-.930	-.814
	Equal variances not assumed			-16.075	38.000	.000	-.872	.054	-.982	-.762

Feasibility Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	55.378	.000	-38.449	167	.000	-.919	.024	-.966	-.872
	Equal variances not assumed			-20.199	36.000	.000	-.919	.045	-1.011	-.827

Trust Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	5.387	.021	-24.951	167	.000	-.957	.038	-1.033	-.882
	Equal variances not assumed			-56.125	140.000	.000	-.957	.017	-.991	-.924

Organisation Size Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	10.852	.001	-12.251	167	.000	-.894	.073	-1.038	-.750
	Equal variances not assumed			-35.576	150.000	.000	-.894	.025	-.944	-.844

Organisation Structure Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	569.144	.000	-17.041	167	.000	-.708	.042	-.790	-.626
	Equal variances not assumed			-10.684	47.000	.000	-.708	.066	-.842	-.575

Privacy Risk Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	9.922	.002	-6.930	167	.000	-.844	.122	-1.084	-.603
	Equal variances not assumed			-29.302	159.000	.000	-.844	.029	-.901	-.787

Government Support Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	8.646	.004	-5.881	167	.000	-.833	.142	-1.113	-.554
	Equal variances not assumed			-28.373	161.000	.000	-.833	.029	-.891	-.775

Regulatory Concern Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	789.752	.000	-15.808	167	.000	-.680	.043	-.765	-.595
	Equal variances not assumed			-10.204	49.000	.000	-.680	.067	-.814	-.546

External Pressure Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	7997.608	.000	-11.593	167	.000	-.557	.048	-.652	-.462
	Equal variances not assumed			-8.692	60.000	.000	-.557	.064	-.686	-.429

Culture Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	11.298	.001	-9.663	167	.000	-.871	.090	-1.049	-.693
	Equal variances not assumed			-32.241	154.000	.000	-.871	.027	-.924	-.818

Industry Type Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	2.848	.093	-37.128	167	.000	-.978	.026	-1.030	-.926
	Equal variances not assumed			-78.518	137.000	.000	-.978	.012	-1.003	-.954

Direct Benefit Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	569.144	.000	-17.041	167	.000	-.708	.042	-.790	-.626
	Equal variances not assumed			-10.684	47.000	.000	-.708	.066	-.842	-.575

Indirect Benefit Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Adoption Attitude	Equal variances assumed	1.931	.167	-46.200	167	.000	-.985	.021	-1.028	-.943
	Equal variances not assumed			-95.812	136.000	.000	-.985	.010	-1.006	-.965

Appendix C

Group Tables of Scheffe Multiple Comparisons on Personal Information

Job Title Multiple Comparisons

Adoption Attitude

Scheffe

(I) Job Title	(J) Job Title	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
IT Director	Strategic Leader	.000	.120	1.000	-.41	.41

	IT Team Member	.000	.079	1.000	-.27	.27
	IT Consultant	.000	.091	1.000	-.31	.31
	IT Expert	.000	.090	1.000	-.30	.30
	Professor/Academic	-.739*	.081	.000	-1.01	-.46
Strategic Leader	IT Director	.000	.120	1.000	-.41	.41
	IT Team Member	.000	.099	1.000	-.33	.33
	IT Consultant	.000	.109	1.000	-.37	.37
	IT Expert	.000	.109	1.000	-.37	.37
	Professor/Academic	-.739*	.101	.000	-1.08	-.40
IT Team Member	IT Director	.000	.079	1.000	-.27	.27
	Strategic Leader	.000	.099	1.000	-.33	.33
	IT Consultant	.000	.061	1.000	-.20	.20
	IT Expert	.000	.059	1.000	-.20	.20
	Professor/Academic	-.739*	.045	.000	-.89	-.59
IT Consultant	IT Director	.000	.091	1.000	-.31	.31
	Strategic Leader	.000	.109	1.000	-.37	.37
	IT Team Member	.000	.061	1.000	-.20	.20
	IT Expert	.000	.075	1.000	-.25	.25

	Professor/Academic	-.739*	.064	.000	-.95	-.52
IT Expert	IT Director	.000	.090	1.000	-.30	.30
	Strategic Leader	.000	.109	1.000	-.37	.37
	IT Team Member	.000	.059	1.000	-.20	.20
	IT Consultant	.000	.075	1.000	-.25	.25
	Professor/Academic	-.739*	.062	.000	-.95	-.53
Professor/Academic	IT Director	.739*	.081	.000	.46	1.01
	Strategic Leader	.739*	.101	.000	.40	1.08
	IT Team Member	.739*	.045	.000	.59	.89
	IT Consultant	.739*	.064	.000	.52	.95
	IT Expert	.739*	.062	.000	.53	.95

*. The mean difference is significant at the 0.05 level.

Education Level Multiple Comparisons

Adoption Attitude

Scheffe

(I) Education Level	(J) Education Level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
PhD Degree	Master's Degree	.000	.094	1.000	-.23	.23
	Bachelor's Degree	-.321*	.077	.000	-.51	-.13
Master's Degree	PhD Degree	.000	.094	1.000	-.23	.23
	Bachelor's Degree	-.321*	.074	.000	-.50	-.14
Bachelor's Degree	PhD Degree	.321*	.077	.000	.13	.51
	Master's Degree	.321*	.074	.000	.14	.50

*. The mean difference is significant at the 0.05 level.

Organisational Sector Multiple Comparisons

Adoption Attitude

Scheffe

(I) Organisational	(J) Organisational Sector	Mean Difference	Std. Error	Sig.	95% Confidence Interval

Sector		(I-J)			Lower Bound	Upper Bound
Civilian Organisation	Military Organisation	.000	.032	1.000	-.09	.09
	Education Organisation	.000	.039	1.000	-.11	.11
	Independent	-.872*	.034	.000	-.97	-.78
Military Organisation	Civilian Organisation	.000	.032	1.000	-.09	.09
	Education Organisation	.000	.039	1.000	-.11	.11
	Independent	-.872*	.035	.000	-.97	-.77
Education Organisation	Civilian Organisation	.000	.039	1.000	-.11	.11
	Military Organisation	.000	.039	1.000	-.11	.11
	Independent	-.872*	.041	.000	-.99	-.76
Independent	Civilian Organisation	.872*	.034	.000	.78	.97
	Military Organisation	.872*	.035	.000	.77	.97
	Education Organisation	.872*	.041	.000	.76	.99

*. The mean difference is significant at the 0.05 level.

Number of Employees Multiple Comparisons

Adoption Attitude

Scheffe

(I) Number of Employees	(J) Number of Employees	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Less than 500	500-1000	.000	.119	1.000	-.34	.34
	1000-5000	.000	.111	1.000	-.31	.31
	More than 5000	-.327*	.091	.006	-.58	-.07
500-1000	Less than 500	.000	.119	1.000	-.34	.34
	1000-5000	.000	.112	1.000	-.32	.32
	More than 5000	-.327*	.093	.007	-.59	-.06
1000-5000	Less than 500	.000	.111	1.000	-.31	.31
	500-1000	.000	.112	1.000	-.32	.32
	More than 5000	-.327*	.082	.002	-.56	-.10

More than 5000	Less than 500	.327*	.091	.006	.07	.58
	500-1000	.327*	.093	.007	.06	.59
	1000-5000	.327*	.082	.002	.10	.56

*. The mean difference is significant at the 0.05 level.

APPENDIX C

Correlation Matrix

Correlations

		Adoption Attitude	Service Quality	Usefulness	Security Concern	Complexity	Cost	Organisation Size	IT Infrastructure Readiness	Feasibility	Trust	Organisation Culture	Organisation Structure	Privacy risk	Government Support	Regulatory Concern	External pressure	Culture	Industry Type	Direct Benefits	Indirect Benefits
Adoption Attitude	Pearson Correlation	1	.444**	.310**	.444**	.382**	.907**	.536**	.916**	.948**	.888**	.688**	.797**	.473**	.414**	.774**	.668**	.599**	.944**	.797**	.963**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169

Service Quality	Pearson Correlation	.444**	1	.698**	1.000**	.861**	.490**	.238**	.407**	.421**	.500**	.646**	.354**	.940**	.933**	.344**	.297**	.742**	.470**	.354**	.461**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Usefulness	Pearson Correlation	.310**	.698**	1	.698**	.812**	.342**	.166*	.284**	.294**	.349**	.451**	.247**	.656**	.749**	.240**	.207**	.518**	.329**	.247**	.322**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.031	.000	.000	.000	.000	.001	.000	.000	.002	.007	.000	.000	.001	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Security Concern	Pearson Correlation	.444**	1.000**	.698**	1	.861**	.490**	.238**	.407**	.421**	.500**	.646**	.354**	.940**	.933**	.344**	.297**	.742**	.470**	.354**	.461**

n	Sig. (2-tailed)	.000	.000	.000		.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Complexity	Pearson Correlation	.382**	.861**	.812**	.861**	1	.422**	.205**	.350**	.362**	.431**	.556**	.305**	.809**	.923**	.296**	.255**	.638**	.405**	.305**	.397**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.008	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Cost	Pearson Correlation	.907**	.490**	.342**	.490**	.422**	1	.486**	.831**	.860**	.979**	.759**	.723**	.521**	.457**	.702**	.606**	.660**	.960**	.723**	.942**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Organisation Size	Pearson Correlation	.536**	.238**	.166*	.238**	.205**	.486**	1	.585**	.565**	.476**	.369**	.672**	.253**	.222**	.692**	.802**	.321**	.506**	.672**	.516**
	Sig. (2-tailed)	.000	.002	.031	.002	.008	.000		.000	.000	.000	.000	.000	.001	.004	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
IT Infrastructure Readiness	Pearson Correlation	.916**	.407**	.284**	.407**	.350**	.831**	.585**	1	.967**	.814**	.630**	.870**	.433**	.380**	.845**	.729**	.549**	.865**	.870**	.882**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169

Feasibility	Pearson Correlation	.948**	.421**	.294**	.421**	.362**	.860**	.565**	.967**	1	.842**	.652**	.841**	.448**	.393**	.817**	.704**	.568**	.895**	.841**	.913**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Trust	Pearson Correlation	.888**	.500**	.349**	.500**	.431**	.979**	.476**	.814**	.842**	1	.775**	.708**	.532**	.466**	.687**	.593**	.674**	.940**	.708**	.922**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Organisation Cultur	Pearson Correlation	.688**	.646**	.451**	.646**	.556**	.759**	.369**	.630**	.652**	.775**	1	.548**	.687**	.602**	.533**	.459**	.870**	.728**	.548**	.714**

e	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Organisation Structure	Pearson Correlation	.797**	.354**	.247**	.354**	.305**	.723**	.672**	.870**	.841**	.708**	.548**	1	.377**	.330**	.972**	.838**	.477**	.753**	1.000**	.767**
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Privacy risk	Pearson Correlation	.473**	.940**	.656**	.940**	.809**	.521**	.253**	.433**	.448**	.532**	.687**	.377**	1	.876**	.366**	.316**	.789**	.500**	.377**	.491**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000

	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Government Support	Pearson Correlation	.414**	.933**	.749**	.933**	.923**	.457**	.222**	.380**	.393**	.466**	.602**	.330**	.876**	1	.321**	.277**	.692**	.439**	.330**	.430**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.004	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Regulatory Concern	Pearson Correlation	.774**	.344**	.240**	.344**	.296**	.702**	.692**	.845**	.817**	.687**	.533**	.972**	.366**	.321**	1	.862**	.464**	.731**	.972**	.746**
	Sig. (2-tailed)	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169

External pressure	Pearson Correlation	.668**	.297**	.207**	.297**	.255**	.606**	.802**	.729**	.704**	.593**	.459**	.838**	.316**	.277**	.862**	1	.400**	.631**	.838**	.643**
	Sig. (2-tailed)	.000	.000	.007	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Culture	Pearson Correlation	.599**	.742**	.518**	.742**	.638**	.660**	.321**	.549**	.568**	.674**	.870**	.477**	.789**	.692**	.464**	.400**	1	.634**	.477**	.622**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Industry Type	Pearson Correlation	.944**	.470**	.329**	.470**	.405**	.960**	.506**	.865**	.895**	.940**	.728**	.753**	.500**	.439**	.731**	.631**	.634**	1	.753**	.981**

	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Direct Benefits	Pearson Correlation	.797**	.354**	.247**	.354**	.305**	.723**	.672**	.870**	.841**	.708**	.548**	1.000**	.377**	.330**	.972**	.838**	.477**	.753**	1	.767**
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
	N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Indirect Benefits	Pearson Correlation	.963**	.461**	.322**	.461**	.397**	.942**	.516**	.882**	.913**	.922**	.714**	.767**	.491**	.430**	.746**	.643**	.622**	.981**	.767**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

N	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX D

Cronbach's Alpha Group Tables for Part 1, 2 and 2.1

Part 1 & 2 Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Job Title	31.50	58.811	.882	.944
Education Level	33.06	72.485	.643	.939
Organisational Sector	33.22	63.208	.933	.935
Number of Employees	32.24	69.530	.616	.943
Adoption Attitude	34.31	75.631	.833	.937
Service Quality	34.46	79.702	.492	.941
Usefulness	34.49	80.620	.357	.942
Security Concern	34.46	79.702	.492	.941
Complexity	34.47	80.144	.434	.942
Cost	34.34	76.237	.794	.938
Organisation Size	34.04	74.635	.779	.937
IT Infrastructure Readiness	34.28	75.166	.856	.937
Feasibility	34.29	75.338	.849	.937

Trust	34.34	76.382	.782	.938
Organisation Culture	34.40	77.944	.655	.940
Organisation Structure	34.22	74.628	.869	.937
Privacy risk	34.46	79.511	.512	.941
Government Support	34.47	79.917	.466	.942
Regulatory Concern	34.21	74.573	.865	.937
External pressure	34.15	74.401	.841	.937
Culture	34.43	78.615	.597	.940
Industry Type	34.33	75.971	.813	.938
Direct Benefits	34.22	74.628	.869	.937
Indirect Benefits	34.32	75.850	.821	.938

Part 2.1 Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Adoption Attitude	76.33	163.411	.740	.966
Service Quality	76.59	165.042	.716	.966
Usefulness	76.56	165.021	.707	.966
Security Concern	76.54	158.738	.889	.964

Complexity	76.47	161.322	.802	.965
Cost	76.51	157.489	.880	.964
Organisation Size	77.28	144.026	.718	.970
IT Infrastructure Readiness	76.63	151.283	.931	.963
Feasibility	76.77	154.893	.916	.963
Trust	76.83	161.024	.707	.965
Organisation Culture	76.44	158.510	.876	.964
Organisation Structure	76.86	159.356	.740	.965
Privacy risk	76.27	159.911	.838	.964
Government Support	76.14	160.718	.818	.965
Regulatory Concern	76.87	159.019	.591	.967
External pressure	77.13	149.150	.833	.964
Culture	76.27	156.890	.876	.964
Industry Type	76.83	158.464	.720	.965
Direct Benefits	76.82	149.139	.926	.963
Indirect Benefits	76.80	158.495	.698	.966