Investigating Cloud Adoption Model using Analytics: A Case Study of Saudi Government Agencies

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Abstract: Cloud computing is an innovation in world technology. It is used to provide organization services as a utility service through the internet and enhance the innovative uptake of cloud computing for improved effectiveness and efficiency. There are adoption challenges in the uptake of cloud computing by government agencies. This paper seeks to identify the attributes of cloud computing which are relevant to public organizations, investigate the factors affecting the adoption of cloud computing and develop an effective model to address these challenges. Sample government agencies from Saudi Arabia are used to investigate the challenges and identify the characteristics from which an adoption model is motivated. The proposed model consists of case study findings based on an analysis of evidence from these organizations. Random samples from different categories of professionals in Saudi Arabia participated in a questionnaire to extract and confirm the influential factors from which insights are derived through classification. The results are then used to determine the tipping point for the uptake of the appropriate cloud model for services provided by government agencies in the Saudi Arabian context. This paper presents the context, motivations, data collection approach, analytics on survey results, tipping point parameters and the principle factors for cloud adoption. Some initial results are presented and future work is summarized.

1 INTRODUCTION

Improving the public sector's services is one of the top priorities for many governments and organizations. Most of the transactional systems in government agencies in the Kingdom of Saudi Arabia are not fully operable because the idea of applying and implementing government services is not practical. Thus, cloud computing and its elastic commercial model of information technology (IT) possession, such as providing data storage and computing power on mandate, promises to provide assistance and many rewards for governments and organizations.

Most of the information technology knowledge used in cloud computing, such as Web 2.0 and virtualization, has previously been used independently. However, cloud computing utilizes nearly all of these abilities to generate the cloud computing atmosphere (Schubert, Jeffery et al. 2010). Cloud computing was first proposed in the 1960s (Chen, Wills et al. 2010), when John McCarthy suggested the idea of using the power of calculation to deliver utility facilities. While some attempts to attain this goal have been developed, such as grid computing, none of them have prospered in contributing a public provision the way cloud computing has. Using the cloud frees administrations from requirements such as needing to spend money and find a lot of space in order to set up their organization's information technology and permits them to pay capital and fees for only the facilities they use in their homes or offices. This can decrease costs and result in both large and small initiatives saving money. Additionally, cloud computing gains litheness, giving enterprises a chance to grow and expand.

However, although there are many benefits of using cloud computing, it is often necessary to radically alter organizations' information technology infrastructure, procumbent procedures and management processes in order to obtain these benefits. Hence, organizations must make significant changes in their people, IT and procedures to include

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cloud computing in their facilities. Cloud computing systems require important modifications to the group business model.

This paper will add to academic research by identifying the challenges in adopting cloud computing in Saudi Arabia such as availability of service, effective leadership management, creativity and a green environment. An in-depth investigation of these challenges will focus on enhancing the value proposition for public organizations in Saudi Arabia to encourage them to adopt this model and technology.

2 ADVANCES IN CLOUD COMPUTING

2.1 Cloud Computing

Cloud computing has been defined in a variety of ways. It can be explained as a system that enables resource-sharing management by using fewer resources and efforts (Wen and Chen 2010). Alharbi asserts that cloud computing facilitates changing software, infrastructure and platforms and allows them to be offered as services to users (Ahuja, Yang et al. 2009). The US National Institute of Standards and Technology (NIST) defines cloud computing as "a model for enabling convenient, on-demand network access to a share pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management afford or service provider interaction" (Mell and Grance 2010). Figure 1 represents the NIST cloud computing concept schema. Industries such as banking and healthcare are moving towards cloud technology because it increases efficiency and provides accessibility through any portable device (Morgan and Conboy 2013). The lack of resources in some countries can be handled using cloud technology (Misra and Mondal 2011) because it costs less than traditional infrastructure installations and allows greater user accessibility. Cloud computing delivers many benefits to organizations. The biggest of these are high elasticity and huge cost reserves due to the on-demand provision of services and its charging model (Bhisikar 2011). Other advantages of cloud computing include increased flexibility, access anywhere, elastic scalability, pay-as-you-go charging, simplicity and distributed data centers. Public establishments and administrations could also benefit from adopting cloud computing technology; for example, one key benefit for public facilities is not having the requirement of setting up their own IT structure and hence reducing costs and organizational expenses (Bhisikar 2011).

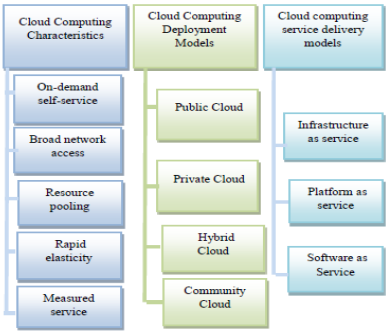

Figure 1: NIST cloud computing concept schema (Alharbi et al. 2015).

3 INNOVATION ADOPTION

Various research that has been conducted in the domain of 'diffusion of innovations' is interdisciplinary by nature, involving numerous areas of science (Rogers 2003). Sociology and psychology have both been influential on the innovation and adaptation of the various theories and models that have been implemented. These two disciplines concentrate on the behaviour of people regarding how technology is accepted, while in information and communication technology (ICT) the focus is on the features of the system. Researchers who focus on innovation diffusion have always been concerned with the acceptance of new technologies at both organizational and individual levels.

The diffusion of innovations theory (DIT) has been exhaustively utilized in studying innovation adoption and diffusion to explain the policies used for the adoption of new ideas and technologies by individuals and organizations. The DIT provides three attributes of the technology that directly impact the adoption rate and affect a person's probability of adoption or rejection: relative advantage, compatability and complexity. **Relative advantage** measures the degree to which an innovation is thought to be better than the previous one; **compatibility** is expressed as the extent to which a change is considered to be consistent with the existing standards; and **complexity** is the degree to which an innovation is perceived as relatively difficult to understand and use.

Tornatzky and Fleischer propose an organization-level multi-perspective framework known as the TOE (Depietro, Wiarda et al. 1990). This framework investigates the impact of three factors (technology, organization and environment) on the organization's decision to adopt a new technology. The technological level describes the specific factors that affect an organization's decision regarding the adaptation of this technology. The organizational contexts describe the characteristics of the organization and the resources that it utilizes. The environmental context deals with the industrial domain of the organization and the related factors such as the potential competitors and technology service vendors. By integrating DIT and TOE, we reduce some of the limitations of DOI and can present a more comprehensive research framework.

3.1 Cloud Computing Adoption

When deciding whether or not to implement cloud computing in the community sector, the administration is responsible for calculating the appropriateness of accepting cloud computing (Lin and Chen 2012 ,Misra and Mondal 2011). They also must assess the influence of cloud computing on the general public and professional processes (McGeogh and Donnellan 2013) as well as estimate the interior promptness of the initiative, current IT set-up and IT human resources for accepting cloud computing (Low, Chen et al. 2011).

Peiris et al. developed a practical model to adopt cloud computing in a private organization in Australia. This model is called the cloud computing tipping model (Peiris et al. 2010). Their model can be used by companies to determine whether adopting cloud computing is beneficial to them or not. This provides an in-depth investigation from the business and technical perspectives. This model uses proven industry practices such as COBIT (Control Objectives for the Information and related Technology) to identify the important attributes that impact ICT organizations in Australia when adopting this technology. These attributes are efficiency gains and a resulting increase in competitive advantages, better creativity, and innovation in products and customer services, improved agility, better security and risk management, better socialization among employees and improved simplicity of IT systems. That model was implemented as artfact and simulated by experiments.

Oliveira and Martins use the TOE model to identify a set of determinants of the adoption of cloud computing by firms (Oliveira and Martins 2008). Their study is theoretically rather than empirically tested and a primary model is suggested based on conceptual reasoning and the literature review. The main factors that the study discusses are size, top management support, global scope, technological readiness, competitive pressure and regulatory support. Low et al. (2011) investigated the factors that affect the adoption of cloud computing by firms in the high-tech industry in Taiwan. They used the TOE model to examine these factors via a questionnaire-based survey used to collect data from 111 companies. They found competitive pressure, trading partner pressure, relative advantage, top management support, and firm size characteristics have a significant impact on the adoption of cloud computing. Lin and Chen (2012) investigated the critical factors that affected the decision to adopt cloud computing technology in Taiwan's hospital industry. They designed a questionnaire based on the TOE model for the chief informational officers (CIOs) in Taiwan's hospitals. Their results indicated that the significant factors concerning the adoption of cloud computing are cost, top manager support, complexity, data security, and technical competence.

Nkhoma et al. (2013) also used the TOE model to find the adoption decision drivers in order to create opportunities for future cloud technologies to be aligned with consumers' needs (Nkhoma, Dang et al. 2013). Chang et al. used the TOE framework to study the adoption of cloud computing in Vietnamese companies (Chang, Hai et al. 2013). The level of cloud computing adoption in Vietnam is in the foundation stage because there are not many adopters. The study identified eight factors as determinants of cloud computing adoption: technological complexity, relative advantage, trading partners' pressure, top management support, formalization, IT infrastructure availability, organizational size and competitive pressure. Borgman et al. (2013) used the TOE model to investigate the factors that affect the decision to adopt cloud computing (Borgman, Bahli et al. 2013). They developed a set of hypotheses that were tested in a quantitative study of 24 international enterprises across various industries. They found that organizational and technological factors affect implementation decisions. This literature review demonstrates that there is no existing model that public organizations can use to help decision-makers

conduct an in-depth evaluation to investigate the main attributes which affect their decision to accept cloud adoption.

3.2 Cloud Computing Adoption in Saudi Government

According to the International Data Corporation (2016), Saudi Arabian individuals and private and small organizations invested about US$ 50.4 million on cloud services in 2014 and they expected this figure to reach US$ 77.4 million in 2016. Most of their requirements were email, communication and collaboration, and content management. However, Saudi government entities are the biggest resistors to adopting cloud computing (IDC 2016) and there is no visible plan to implement any cloud computing solutions in the government sector due to the overly bureaucratic structure of the multiple sectors and layers of the existing government machinery. A major push and initiative from someone in a position of authority or a member of the royal family is needed before the Saudi government will develop a strategy to discover the essential benefits offered by cloud computing solutions to stakeholders. Other reasons for this resistance are a lack of awareness and security issues.

In Saudi Arabia, cloud computing is still in its beginning stages. Few studies have been conducted in the Saudi context. Chanchary and Islam (2011) observed a phenomenon of striking inefficiency in Saudi Arabia during their research on existing e-government systems. They recommended that incorporating a software-as-a-service (SaaS) layer would greatly improve e-governance efficiency and help users in their decision-making processes. They suggested that this additional layer would facilitate better access to information. The study concluded with the assertion that this integration would help improve any e-government services provided. Additionally, the technology acceptance model (TAM) proposed by Alharbi (2012) can be used to assess acceptance levels in an organization. A study found that the acceptance rates for cloud computing were highly dependent on users' ages, attitudes, jobs and educational backgrounds (Alharbi 2012). Yamin (2013) did a study of cloud computing awareness from an organization level in Saudi Arabia. He predicted that cloud computing will be a future platform for Saudi's organizations. Alkahter (2014) identified the factors with the most influence on the intention of private organizations in Saudi Arabia to adopt cloud services. This study found that the factors of reliability, complexity, availability and privacy had a significant impact on the decision to adopt cloud computing.

Reviewing the previous studies illustrates that there is an absence of theoretical and empirical studies concerning the adoption of cloud computing in the government sector in developing countries, specifically in Saudi Arabia. Public organizations' business initiatives are different and more complex than those of a private organization. Researchers have emphasized the need for an increased focus on how organizations adopt innovations (Mohammed and Ibrahim 2014). Some researchers recommend applying theoretical models and empirical studies for cloud adoption decisions because there is a shortage of research in this area (Mohammed and Ibrahim 2014). Furthermore, no study to date has investigated and analysed data on government adoption in order to determine the tipping point parameters and principle factors. Thus, providing more data analytics is a valuable contribute to the research.

3.3 Proposed Cloud Computing Adoption Model for Saudi Government

The authors address the need to find the main factors which impact on an organization adopting cloud computing and conclude the main tipping point parameters based on survey analyses. The author conducted two cases studies of participants' who responded to the survey to clarify their responses.

3.3.1 Case Study 1

The first case study analysed a Saudi government organization regarding their adoption of cloud services. This organization is a part of the education and training sector in Saudi Arabia. They have recently implemented the Google cloud email service package of Google Apps Suite. This organization manages about 32 faculties across the Kingdom of Saudi Arabia and they employ more than 1,000 staff. IT lecturer who held a senior IT position in this organization's data center had been interviewed to clarify his survey responses. He told me about the obstacles in providing email services to all the staff in this organization. The main obstacle was availability, in that they could not guarantee the availability of the email service and, when it did not work, this service stayed offline for a long time until they fixed it. This occurred because the organization

had no qualified people to manage it, a shortage in support contracts and a lack of financial resources. On occasion they had asked academic IT staff to work with them as IT support staff.

Other issues faced by the organization included security patches and limitations in storage. Finally, they faced a problem with data center space and the growth in some servers. This negatively impacted on the environment and space. Moreover, the increasing maintenance and upgrade costs were too high for the organization.

Based on these issues and the growing demand from the organizational staff for email services, the organization adopted cloud computing in order to provide this service to its employees. After adopting the email service via the cloud, they noted the difference between in-house email and cloud email. They achieved many benefits, such as improved efficiency in their services, 24x7 availability, increased mailbox size and good security management with advanced hardware. They also gained good support via qualified people from the provider, which saved the organization space that it could use as training centers for students. Maintenance and development costs decreased. Also, transferring what had been a problem to qualified providers simplified their business model. Finally, by reducing the number of servers, the organization contributed to a cleaner environment.

3.3.2 Case Study 2

The second case study analysed a different Saudi government organization regarding their adoption of cloud services. This organization is a part of the military sector in Saudi Arabia that recently implemented a private cloud model to provide some services for its staff such as email services. These organizations manage over 25 branches across the Kingdom of Saudi Arabia. They have more than 2500 staff. IT manager in this organization had been interviewed to clarify his survey responses. He described why the organization decided to adopt some cloud services such as email and SharePoint. The reasons that motivated the organization to adopt cloud services were the growth in the number of branches as well as human resources and the organization's objectives. If they went with traditional in-house IT services, they would need to create a complete infrastructure for every branch with software licences and the cost would have been high. Thus, cost saving is important for them because they have limitations in their budget. Additionally, security is important for them because they deal with a lot of sensitive data. Thus, they implemented a private cloud infrastructure at head office. He reported that while this type of model is costly and more complex to manage than a public cloud deployment model, for his organization, security issues have the highest priority.

The outcomes of adopting the cloud for this government agency were improved user collaboration and productivity, service availability anywhere and anytime for their staff, cost savings relative to a decentralized model, improved power consumption and increased efficiency and effectiveness of the technology and workforce.

3.3.3 Analysis of Case Studies

3.3.3.1 Case Study 1

A close look at Case Study 1 reveals that the decision to adopt Google's cloud computing services through the provider was a result of organizational changes. This decision helped the organization face growth challenges as well as to fix the issue of existing resource capabilities, such as using lecturers as support staff, which had impacted negatively on the organization's objectives.

The key points that can be understood from this case study are the following:

1. Cloud computing can provide more availability and reliability for organizational services. Thus, availability is one of key tipping point parameters for adopting cloud computing.
2. Cloud computing can provide more flexibility and agility by responding quickly to a growth in users or new organizational requirements. Thus, flexibility and agility are two of the key tipping point parameters to adopt cloud computing.
3. Cloud computing helps organizations to be greener by saving data center space and power consumption. Thus, supporting a green environment is one of the critical tipping point parameters to adopt cloud computing.
4. Cloud computing can help with resource capabilities. Thus, an adequate resource capability is a factor that positively influences the adoption of cloud computing.
5. Cloud computing can help to decrease variable and fixed infrastructure costs significantly.

6. Cloud computing will improve competitive advantages and efficiency by increasing the focus on core competencies and objectives because some of the IT services have been outsourced to a service provider.
7. Cloud computing is an optimal option when an organization has limited funds.
8. Cloud computing as IT innovation technology works as the best enabler for Case Study 1 to focus on core business objectives.
9. The growth in organization size and effective leadership support played a main role in this case in the decision to adopt cloud computing. Thus, effective leadership is a positive influence on the adoption of cloud computing.
10. Finally, simplicity played a main role in the decision to adopt Google Apps Suite in this case.

3.3.3.2 Case Study 2

A close look at Case Study 2, a government organization in the military sector, reveals that the decision to adopt and implement private cloud computing was a result of major organizational and business objective changes and an expansion that created new branches throughout Saudi Arabia. They took the action to adopt their own cloud to manage and provide necessary IT services such as email and SharePoint through the head office. They agreed that the implementation of a private cloud deployment model is costly, but they prefer it for security concerns. Security is the highest priority for them over other factors such as cost.

The key points that can be understood from this case study are the following:

1- Cloud security is a significant matter for this organization's business requirement.
2- The military sector of public organizations pays more attention to security than other benefits.
3- Cloud computing technology is flexible technology that can provide multiple types of deployment models based on the organization's needs.
4- The complexity of deploying and managing a private cloud model was a negative influence on this case.
5- The cloud increases the efficiency and effectiveness of the technology and workforce.
6- Cloud computing can provide major socialization among an organization's staff as they can become nearer in effective association regardless of their physical location.

3.3.4 Proposed Adoption Model

Based on the challenges identified in the above case study analysis, Figure 2 shows a proposed TOE model.

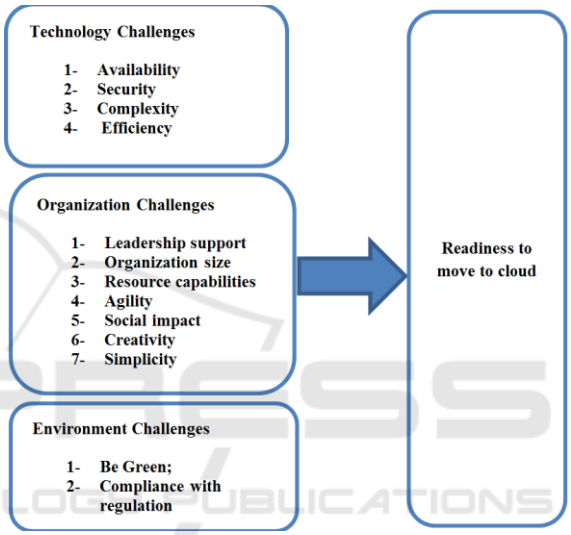

Figure 2: Proposed model.

4 VALIDATING THE CASE STUDIES FINDINGS

The authors continued to validate the proposed model which was generated by previous case studies. They have investigated several research methods to complete this task. They decided the survey method is a good instrument to achieve suitable outcomes. They produced a comprehensive survey based on previous studies which used the TOE framework and a cloud computing tipping point study (Peiris et al 2010). This survey was distributed to decision-makers, information technology (IT) managers and experts at government organizations in Saudi Arabia to explore their experience with cloud computing interaction through a series of questions. Most of the participants in this survey held senior IT department and IT

management positions, so they therefore had the capability to recognize the future trends and current situation of their organizations.

About 102 participants responded to this survey. Their data helped to determine the decision-makers' perceptions of cloud computing platforms as opposed to an in-house platform. Additionally, the responses allowed the researchers to find effective response models for their challenges.

The survey used a five-point Likert scale to gather participant's inputs, which ranged from 1 (strongly disagree) to 1 (strongly agree). The survey consists of 46 questions. The collected data was analysed by SPSS and R software.

5 DATA RESULTS AND ANALYSIS

5.1 Data Analysis

The data used in this project was collected through a survey conducted in Saudi Arabia. The participants in the survey belonged to different organizations and work in different professional categories. All of the collected data are in categorical measurements. The aim of this analysis is to clarify the previously developed models for cloud computing in Saudi Arabia. The cluster analysis method was used to identify the similarities and dissimilarities in the cluster model for cloud computing. Before starting the analysis process, we did data cleaning to get a clear dataset on behalf of optimum analytical results. In data cleaning, we removed the out of range and duplicated data.

5.1.1 Data Cleaning

Data cleaning is an important step before analysing data. Data cleaning is process of removing irrelevant information, removing out of range data, and removing incorrect answers from a questionnaire. This procedure is especially necessary for survey data. Survey data has a lot of irrelevant information, out of range information and incorrect answers to questions. Data cleaning is a useful step to get rid of analytical errors. Incorrect information leads to incorrect decisions and incorrect conclusions, so it is an important step to clean the data before analysis. Errors of data can happen for many reasons and some of the different ways that data errors can happen is explained below (Hellerstein 2008).

If the dataset is comparatively small, a manual data cleaning method can be applied. In this process, data sorting is a required step. When data has been sorted it is easy to identify irrelevant data from the spreadsheet. However, most datasets have millions of records and a vast numbers of attributes. In this situation, manual data cleaning methods are not possible, so computer base algorithms can be used to clean data.

5.1.2 Analytical Methods

Data distribution was not clearly satisfied with normal distribution assumptions. Both kurtosis and skew were not zero (Mordkoff 2011). Cluster analysis and regression analysis are used to identify the tipping points in the survey results. Cluster analysis divides the data into meaningful groups. Regression analysis is used to identify the significant individual variables and regression analysis explains the overall significance of the model.

5.2 Results

The cluster model and regression models were used to identify the participants' preferences concerning the implementation of cloud computing in Saudi Arabia. Figure 3 explains five clusters according to the participants. Participants in each cluster had similarities about their preferences of cloud computing. According to the organization type, situation and participants' position, the organization had similar ideas about the implementation of cloud computing. The first cluster on the left side represents 28% of civil organization employees who held IT manager positions. 22% of them have a plan to adopt cloud computing in next three years and 6% reported that they did not think about the cloud. The second cluster represents 35% of civil organization employees who held CIO, senior manager and computer engineer positions. All of them planned to adopt cloud computing in the next three years. The third cluster represents 10% of military organization employees who have IT architect, senior manager and policymaker positions. 7% of them adopted some cloud service and the other in next three years. Cluster 4 represents 12% of civil organization employees who have CIO and senior manager positions. All of them adopted some cloud services. The last cluster represents 11% of civil organization employees who have IT manager and IT architect positions. They reported adopting some cloud services.

These results show that participants from IT-related organizations have positive ideas about cloud computing. However, the participants from non-IT organizations had different ideas about cloud computing.

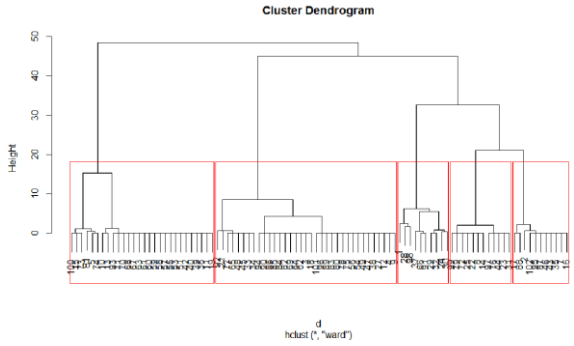

Figure 3: Cluster diagram (1).

According to the Figure 4 cluster diagram, participant numbers 5, 11, 16, 30, 56 have similar ideas about cloud computing. All of these participants are in same organizational situation and hold similar position types. All of those participants are IT professionals and they are interested in cloud computing. The other four clusters have overlapping participants. There are no significant dissimilarities among those clusters.

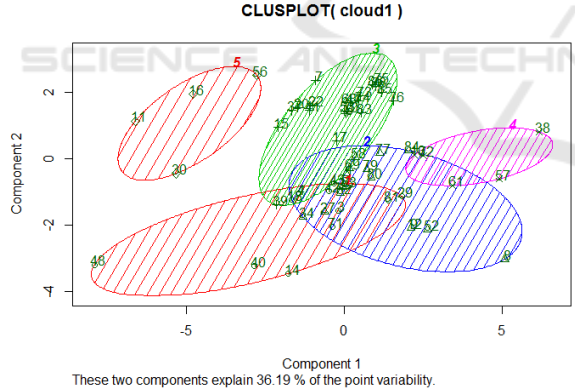

Figure 4: Cluster diagram (2).

The regression model was used as an effective model to respond to challenges in cloud computing adoption in Saudi Arabia. One of the organizational challenges for the adoption of cloud computing in Saudi Arabia is leadership support. Thus, the model in Table 1 explains the factors influencing this challenge. Organization size, social impact, creativity, being green, resource capability and security factors are significant parts of the leadership challenge to adopt and implement cloud computing.

According to the regression results, creativity and going green a have positive linear relationship with dependent variable (leadership support) while resource capability has a negative linear relationship. The relationship between leadership (dependent variable) and other predictors' variables can be represented by the following equation:

$$Leadership\ support\ (Y) = 2.063 + 0.442\ (organization\ size) - 0.149\ (social\ impact) + 0.315(creativity) + 0.225(go\ green) - 0.303(resource\ capabilities) + 0.116(security)$$

Table 1: Regression model for organizational challenges.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.063	.516		3.995	.000
	OrganisationSize	.442	.076	.460	5.830	.000
	SocialImpact	-.149	.068	-.209	-2.187	.031
	Agility	-.124	.080	-.135	-1.560	.122
	Creativity	.315	.102	.359	3.102	.003
	GoGreen	.225	.086	.274	2.630	.010
	ResourceCapability	-.303	.078	-.395	-3.892	.000
	Security	.116	.057	.204	2.023	.046

a. Dependent Variable: Leadershipsupport

Table 2 explains the overall model. Thus, the overall model for leadership support is significant.

Table 2: ANOVA Regression model.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.543	7	1.220	10.594	.000[b]
	Residual	10.829	94	.115		
	Total	19.373	101			

a. Dependent Variable: Leadershipsupport

b. Predictors: (Constant), Security, OrganisationSize, SocialImpact, ResourceCapability, Agility, GoGreen, Creativity

Additionally, the regression model in Table 3 explains that the availability of services is a challenge to adopting and implementing cloud computing in Saudi Arabia. Thus, simplicity, compatibility, efficiency and security parameters are significant. According to the regression results, efficiency and security have a positive linear relationship with availability. The relationship between availability (dependent variable) and other predictors' variables can be represented by following equation:

$$Availability\ \ (Y) = 2.338 + 0.363\ (Efficiency) + 0.147\ (security)$$

Table 3: Regression model for technological challenges.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.338	.506		4.620	.000
	Efficiency	.363	.088	.373	4.110	.000
	Simplicity	-.049	.073	-.063	-.672	.503
	Compatibility	.020	.070	.028	.281	.779
	Security	.147	.052	.282	2.803	.006

a. Dependent Variable: Availability

Table 4 explains the overall model. Thus, the overall model for availability is significant with efficiency and security.

Table 4: ANOVA Regression model.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.322	4	.830	6.314	.000[b]
	Residual	12.757	97	.132		
	Total	16.078	101			

a. Dependent Variable: Availability

b. Predictors: (Constant), Security, Efficiency, Simplicity, Compatibility

6 DISCUSSION

Based on the participants' data and cluster algorithm results, we found a relationship between the participants' knowledge and experience and their acceptance towards adopting cloud computing. People with IT qualifications are more confident with cloud technology than people without these qualifications. Coursaris and Kim (2011) found that adoption can be influenced by four sets of contextual factors: technology, user, environment and tasks. Thus, knowledge and experience can be considered two of the main contextual factors that promote or hinder the adoption of cloud computing in Saudi government organizations. Government policies can also play a main role in accepting cloud adoption. However, to date there are no specific policies set by the Saudi government regarding the adoption of cloud computing.

The regression model provided an effective model for some challenges which impact on the cloud adoption and implementation decision. The availability of services plays a main role in cloud computing adoption. Thus, it can be assumed that the availability of services is a tipping point parameter to the adoption of cloud computing in Saudi Arabia. Also, to guarantee good availability of services, there needs to be a secure, efficient, manageable and compatible platform to implement it. Security is a highly significant parameter for availability.

Additionally, leadership support plays a main role in adopting cloud computing. Thus, it can be assumed that leadership support is a tipping point parameter to adopt cloud computing in Saudi Arabia. This parameter depends on organization size, social impact, creativity, going green, adequate resource capability, and security. Top management people think about environmental benefits, thus going green represents being environmentally friendly. This factor is highly significant and impacted on leadership support towards adopting cloud computer. Finally, these results agreed with some previous studies such as Peiris et al (2010) concerning social impact and security parameters.

7 CONCLUSIONS

It can be concluded that cloud computing technology has many benefits for any organization. Government agencies are looking for innovative technology for their services and the cloud can be the right innovative technology for them. The authors explored two case studies from Saudi government organizations and the experience of staff within those organizations concerning implementing cloud computing to provide services to their staff. This paper found a positive perception from civil organizations toward adopting a cloud platform. Also, it identified new challenges such as availability, leadership support and green environment. Effective models contribute to overcoming availability and top leadership support challenges.

It can be concluded that knowledge and experience are the main contextual factors that can speed up the adoption of technology. Finally, we can conclude that most of the top level professionals in public organizations in Saudi Arabia are interested in cloud computing technology. Future works will investigate the model data in-depth to figure out the impact of these results.

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