Exploratory Study to Investigate the Factors Influencing the Adoption of Cloud Computing in Australian Regional Municipal Governments

[1]Omar Ali, [1]Jeffrey Soar, [1]Jianming Yong, and [1]Hoda McClymont

[1] University of Southern Queensland, Australia
{Omar.Ali, Jeffery.Soar, Jianming.Yong, Hoda.McClymont}@usq.edu.au

Abstract: Cloud computing is seen as an increasingly important enabler for improving productivity, efficiency and cost reduction. This research aims to investigate the potential for value creation for Australian municipal governments by identifying factors that are perceived likely to influence the adoption of cloud computing. The research model is proposed based on two theories derived from the literature: the technology-organization-environment (TOE) framework and the diffusion of innovation (DOI) theory. The research employed in-depth interviews of Australian councils' IT managers. The obtained results indicate that the critical factors that were identified as playing a significant role in Australian regional municipal governments' adoption of cloud services were: relative advantage, compatibility, cost, technology readiness, competitive pressure. For practitioners, this research identifies key factors for regional municipal governments to make an adoption decision toward cloud computing technology. As for academia, this research can be provided as a useful reference for future studies in this subject field.

Introduction

Information Technology (IT) is considered to be one of the important means by which nations can enhance their development and attain better living standards. IT does not just have socio-economic implications [1], it also enables of variety services to meet human needs [2]. IT provides methods by which nations can advance and succeed in the global financial, political, social, and instructive fields. IT can aid in improving effectiveness, profitability, organizational services and maximising the utilisation of assets [3][4].

The advent of recent IT innovations such as cloud computing in the recent years has attracted interest from different stakeholders such as businesses organizations, institutions and government agencies [5]. This is fuelled by the potential of cloud computing to reduce cost of services through the user-pays principle. Cloud computing offers a shift from PC installed software to cloud based services that can accessed anywhere and anytime. Cloud computing offers greater scalability and on-demand provisioning of resources.

Cloud computing is one of the innovations that has attracted attention in the information and communication technology (ICT) sectors [6][7][8]. This technology has generated interest for its potential to deliver IT services through the Internet [7][8] and also there is interest and increasing adoption of cloud computing by governments [6]. It is estimated that the size of the worldwide cloud computing market was worth US$20.3 billion in 2009 and is anticipated to reach US$100.4 billion by 2016 [9].

Cloud computing is complementary to e-government as a potential means to supply the public with more services [10]. Cloud computing can be seen as a type of green technology, it can potentially improve the utilization of data centre resources with less energy consumption. Through the use of large shared servers and storage units, cloud computing can offer energy savings in the provision of computing and storage services [10][11][12][13].

There is a need for more information, development, and promotion to encourage adoption in order to realise these benefits [14]. The recent economic slump has stimulated interest in cloud services adoption as a means of reducing costs [15]. Despite the rapid adoption of this technology, there are limited theoretical studies that deal with the factors that impact the adoption of cloud computing. Many studies are published as white papers, government newsletters and policy statements which lack proper methodology and evidences [6] [16]. There is a lack of exploratory studies that provide an in-depth and holistic investigation related to the factors that affect the adoption of cloud computing [17][18]. There appears to be a dearth of studies that have been conducted to assess the adoption of cloud computing in regional municipal governments. Most of the empirical studies have focused only on advantages and associated risks of cloud computing and failed to address the factors affecting adoption of cloud computing. This situation has prompted regional municipal governments to request further research to guide their cloud adoption and implementation decisions [19].The current gap in the literature has led us to the following research problem: What are the key factors that are perceived to influence the adoption of cloud computing in Australian regional municipal governments?.

The paper is structured as follows: first, we provide an overview about the concept of cloud computing, its benefits, past studies, and the research adoption models. Next, we illustrate the conceptual research model for this research. Then, we explain the methodology used to collect data for this research. This section involved in-depth interviews with IT managers in Australian regional municipal governments. Then we outline the findings and discussion of the research data. We conclude this paper with a research limitations and future research; and conclusion.

Theories and Literature Review

The concept of cloud computing technology

The advent of cloud computing has been a paradigm shift in the IT domain [20]. It is the result of significant innovations in virtualization, utility computing, elasticity, distributed computing, grid computing, storage, content outsourcing, security and Web 2.0, and networking [21]. Cloud computing includes computing resource services, soft applications of distributed systems and data storage [17]. The computing world is rapidly transforming towards a system of deriving relative applications for millions to extend as a service rather than to run on their personal computers [17]. The most widely used definition of the cloud computing model is introduced by the U.S. National Institute of Standards and Technology as *"a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of services (for example, networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"* [22]. The NIST definition recognises the availability of cloud computing and describes its five essential characteristics: on-demand self-service; broad network access; resource pooling; rapid elasticity; and measured service [22]. Cloud services can be categorised on the basis of the following three service/delivery models: Software as a Service (SaaS); Platform as a Service (PaaS); and Infrastructure as a Service (IaaS) [10][23][24]. There are believed to be four cloud deployment models: public; private; community; and hybrid cloud [10][21][24][25].

Benefit of Cloud Computing Adoption

The literature indicates that, the chief driving component for organizations to think about receiving cloud-based operational models is the anticipated profits that these organizations will make by adopting the new cloud-based operational models [26]. The advantage that cloud computing has includes offering lower starting expenses [26][27], better standardisation of services [28], and greater adaptability for business [27]. Other advantages include increased accessibility and scalability of services, making this sophisticated system to be widely implemented in several sectors [29][30]. Through employing cloud computing governments and public authorities can focus more on their core business instead of on the IT resource provision, and maintenance [27]. Some of the prime advantages of this advanced computing system, particularly for e-government services, include minimizing the infrastructure and platform charges, improved security of the networks, improved scalability of services and enhanced adoption speed [30][31][32].

Previous Research on Cloud Adoption

Cloud computing adoption is an inventive method for organizing technology [11], and is a broadly examined issue [33]. The aim behind this part is to furnish an outline around earlier research of cloud computing. Numerous studies attempt to appear with the best significance of cloud computing. Previous research about cloud computing has addressed new technologies, security and privacy requirements and the future opportunities in these emerging environments. There are two types of business models offered by reference [18] that can be drawn for organizations

that preparing to adopt cloud computing as a services. One is for organizations with an existing IT infrastructure and the other is for start-up organizations. There is literature available on infrastructure as a service (IaaS) [34][35][36], utility computing and the smart data centre [37], enterprise resource planning (ERP) offered by cloud suppliers [27], e-learning applications [38], and virtual computing lab (VLC) [39], in market-oriented resource allocation of cloud computing by leveraging third-generation Aneka enterprise grid technology [40], development [41], computerized scientific examinations [42], service industry [43], science [44], and performance networks and data mining applications [45].

Research Adoption Models

An innovation is 'the generation, development, and adaptation of novel ideas on the part of the firm' [46]. This type of innovation, from an IT perspective, refers to a new practice or operational idea [47]. Studies of innovation adoption have focused on both individual and organization level of analysis [48]. Early literature on innovation was concerned with the acceptance of new ideas and innovations by independent individuals [49]. As early as in the late 50's developments in the field of innovation led to a growing interest in organizational innovation [50]. The field of innovation in organizations was applied in the 1980s to the study of new communication technologies [51].

In this research the key theories of Technology-Organization-Environment (TOE) framework [52], and Diffusion on Innovation (DOI) theory [53], will be combined to develop a comprehensive model for further investigation. This combining of models provides a better understanding of the IT/IS adoption phenomenon [45][55][56]. The TOE framework includes a focus on the environment context of technology adoption, which is not included in the other theories and models, and it is better able to explain intra-firm innovation adoption [57]. Empirical support and theoretical basis are the main advantages of the TOE framework and DOI theory. Compared to other theories, the TOE framework overcomes the domination of the technical perspective and provides a useful analytical tool [58]. Studies about IT/IS adoption at the organizational level are derived from using TOE framework, DOI theory or other similar models [57][58].

Most studies that use theories of technology adoption at the organizational level are the technology-organization-environment (TOE) framework and diffusion of innovation (DOI) theory [57][59]. Some researchers analysed the adoption of technology based on the TOE framework [59][60][61][62][63], others have chosen to study it through the DOI theory [64][65][66][67], although others have suggested studying the adoption of technology based on the two models together [54][55][68][69]. While TOE framework and DOI theory have been individually applied successfully to numerous studies to adoption of innovation at organizational level; both models have been successfully combined together to numerous studies to adoption of innovation at organizational level. This combined model has not been applied to the adoption of cloud computing.

The key literature on the selected factors that affect the intention to adopt cloud computing is shown in Table (1).

Table 1: Selected factors used on TOE and DOI model

Theory	Technology adopted	IT specific innovation	Factors used to test adoptability												
			RA	C1	C2	C3	TR	SEC	OS	TMS	EK	CP	GR	II	BEN
TOE	EDI	[70]				*	*					*	*		*
	E-Business	[56][57][61][63][71]		*			*	*	*			*	*	*	*
	Cloud computing	[17]	*	*	*		*		*	*	*	*			
	Integration of e-business	[59]		*			*					*	*		*
DOI	MRP	[65]		*			*					*			
	Internet	[66]	*	*			*		*	*	*				
	ERP	[64]	*	*	*					*	*				
TOE & DOI	Software application	[69]	*	*	*					*		*	*	*	
	Collaborative commerce	[54]	*	*	*					*		*		*	
	E-Business	[56]				*		*		*					
	RFID	[55]	*	*	*		*		*	*		*		*	

[RA - Relative advantage, C1 - Compatibility, C2 - Complexity, C3 - Cost, TR - Technological readiness, SEC - Security, OS - Organization size, TMS - Top management support, EK – Employees' knowledge, CP - Competitive pressure, GR - Government regulation, II - Information intensity, BEN - Benefits]

The table above illustrates the most important studies that used either the TOE framework or the DOI theory on their own or together for IS adoption. It demonstrates the significant factors that have been repeatedly shown to be relevant for the adoption of different IS specific innovations such as (relative advantage, compatibility, complexity, technological readiness, security, top management support, cost, information intensity, organization size, government regulation, competitive pressure, and benefits). This research will further explore and investigate why and how these factors are important for the adoption of cloud computing.

Technology-Organization-Environment (TOE)

The TOE framework structure was produced in 1990 [52], and suggests that adoption of IT technology by organizations is affected by three diverse contextual groups: technological context, organizational context, and environmental context [52][72].

- The technological context denotes the attributes of innovation. That is, availability, complexity, and compatibility, altogether influence adoption of innovation [17][72]. The technological context refers to internal and external factors that can affect the firm [52].
- The organizational context denotes the attributes of an organization, for example, size, the level of intricacy in managerial structure, level of formalisation, human assets, measure of slack assets, and linkages around representatives [17][52].
- The environmental context incorporates structure of the industry, contenders, and government's regulations and approaches [52].

Diffusion of Innovation (DOI) Theory

DOI is a theory of how, why, and at what rate new thoughts and innovation spread through societies, working at the individual and organization level [49]. DOI theory sees innovations as being conveyed through certain channels over the longer timeframe and inside a specific social framework [49]. People are seen as owning distinctive degrees of readiness to embrace innovations, and it is usual that people take some time to embrace new technology [49]. Five classifications are proposed from earliest to latest adopters of individual or corporate preparedness for innovation: innovators; early adopters; early majority; late majority; and laggards [53].

Within the organizational level DOI theory shows that, innovativeness is related to independent variables as individual (leader) characteristics, internal organizational structural characteristics, and external characteristics of the organization.

Individual characteristics describe the leader attitude toward change.

Internal characteristics of organizational structure include factors such as centralisation, complexity, formalization, organizational slack, interconnectedness and size of organization [53] whereby:

Centralisation is the degree to which power and control in a system are concentrated in the hands of a relatively few individuals;

Complexity is the degree to which an organization's members possess a relatively high level of knowledge and expertise;

Formalization is the degree to which an organization emphasizes its members' following rules and procedures;

Organizational slack is the degree to which uncommitted resources are available to an organization;

Interconnectedness is the degree to which the units in a social system are linked by interpersonal networks;

Size of organization is refer to the number of employees of the organization.

External characteristics of organizational refer to system openness.

Conceptual Research Model

In this research, a theoretical framework has been developed based on the TOE framework and DOI theory. That is, the three contexts of the TOE framework including: Technology context which refers to cost; technology readiness; and security). Organization context which refers to size of organization; top management support; and employee's knowledge and Environment context which refers to competitive pressure; regulation support; and information intensity [17][52][57][72], were combined with only one factor of the DOI theory including: Innovation characteristics which refers to relative advantages; compatibility; and complexity [53] . The three factors of TOE framework and the only one factor of DOI theory were also combined with benefits characteristics [11][73][74] as shown in Figure (1).
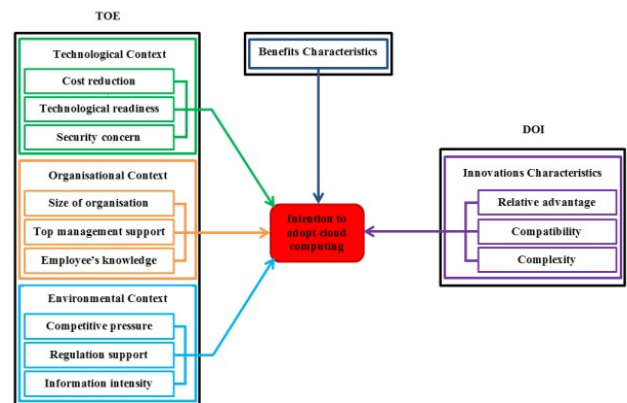
Figure 1: Research model

The twelve variables in this research model are divided into five main categories. Figure (1) illustrates the variables

categorised into five groups: innovation characteristics, technology context, organizational context, environmental context and benefits characteristics. These groups are expected to impact the intention to adopt cloud computing among the Australian regional and municipal government. These concepts derive from the TOE framework and DOI theory.

Data Collection and Analysis

Participants and data collection

This study is exploratory in nature, seeking to provide a qualitative overview of the concepts with highest salience relating to cloud computing adoption from the perspective of a local government IT professional. A total of 21 in-depth interviews took place in Queensland local government councils. The data collection took place between May 13, 2014 and August 12, 2014. The sample reflects the geographical spread and size classifications of local councils throughout Queensland (Coastal – 29%; Resource – 14%; Indigenous – 10%; Rural/Remote – 29%; South East Queensland – 18%) (See Table 2).

Table 2: Size classification

Segments	Size classification					Total	%
	Extra small	Small	Medium	Large	Very large		
Coastal	0	1	2	2	1	6	29%
Resource	0	1	0	2	0	3	14%
Indigenous	0	2	0	0	0	2	10%
Rural/Remote	1	1	2	1	1	6	29%
South East Queensland	0	0	1	1	2	4	18%
Total						21	100%

To help improve the reliability of this research, the Kirsch model was adopted [75]; this model defines a set of procedures: Firstly, to identify and select the research issues. Secondly, to determine who to interview. Finally, how the interviews were to be conducted.

Interviewees for this research identified as IT director, IT practitioner who refers to IT executive, IT manager who is responsible for IT management and planning and director of IT services. These are the most essential stakeholder groups who are in charge of adoption of the cloud computing for the councils.

The interview protocol was developed based on the literature. This protocol was used to guide the interview process. The interviewer followed a sequence of steps: Planning the interview, introductions at the commencement of the interview and establishing rapport with the respondent through small chat [76]. Ethical clearance was obtained through University of Southern Queensland (USQ). Each interview was structured around eight questions, with the interviewers asking probing questions based on responses. The questions required the participants to first describe their role in IT/IS field. Then, they were asked to describe their background, experience and knowledge in relation to cloud computing. The third one comprised a question about the length of time that they been involved with cloud computing projects and in what capacity. The other questions they were asked to describe the impact of the innovation characteristics, technological, organizational, environmental contexts, and benefit characteristics on the intention to adopt cloud computing in Australian regional municipal governments

The interviews lasted between 30 and 50 minute. The interview questions were designed as largely open questions to encourage the interviewees to provide answers that revealed their attitudes and perceptions relating to the research topic [77]. Altogether, 24 interviews were carried out with IT managers of the chosen councils. The research reached the saturation level within the interview number 18, when the researcher notice that, there is no more new information or patterns in the data emerging from the interview. Another six interviews were conducted to ensure inclusion of all segments and size classification of the councils to obtain a comprehensive overview of issues (refer to table 2). About 21 interviews were take a part in the analysis process, and the other 3 interviews excluded from the analysis process because it was discovered during the interview that these 3 IT managers were not coming from IT background and they had not any experience or knowledge in relation to cloud computing.

Data analysis

The interviews data was analysed using manual content analysis method [78], and using Leximancer. Manual content analysis was undertaken as a first step in the analysis which included three concurrent flows of activities: data reduction, data display and conclusion drawing/verification [78][79][80]. After the completion of each interview session, the recorded interviews were immediately transcribed. Interview transcripts were reviewed to create summary sheets for each interview [81]. This summary sheet included main themes, issues, problems and brief answers to each question, resulting in an overall summary of the main points in the contact [82][83]. Then the summary sheets were reviewed to develop a pattern code for the research data. The next step of the analysis was to develop data display, which organised assembly of information to permit the researcher to draw conclusions and taken actions [78]. Once manual coding was completed, the data was then reanalysed using Leximancer to improve the reliability of the findings [84][85].
Leximancer is a data mining tool that can be used to analyse the content of collections of textual documents and to visually display the extracted information [86]. It uses ontological relativity and dynamics to assemble bits of information to structure and evaluate concepts [87]. Words are combined to form concepts (thematic analysis) and identify relationships (semantic analysis) between concepts. A 'concept map' displays the main concepts in the text data, depicting the relationships through visual summaries of concepts and their co-occurrences – similar to a mind map [87]. Combined use of both manual and software analytical approaches provided a robust basis for clearly delineating concepts, themes and aggregate dimensions [84][85].

Validity and reliability

Qualitative methods including in-depth interviews should be examined for their validity and reliability [88]. Validity and reliability can be reached over different methods of cross-checking [89]. These different methods of quality controls for qualitative research can be taken consideration by using four different research design tests: construct validity, internal validity, external validity and reliability [90]. Each of these tests will be described next.

Construct validity exists under the in-depth interviews as the researcher is constructing an agreement related to the construct meaning by carrying out several interviews [77]. This method is flexible for various interviews and permits the refined approach of the construct. Construct validity can be obtained by triangulating the interview questions and constructs through the use of two carefully worded questions that determine the same issue from different perspective [89]. Triangulation of interview questions was designed in this research for the important constructs only in order to prevent iteration or non-concerned perception to the participant [77].

Internal validity refers to the validity and relationships of the variables' effects in a system on the other variables [91]. Exploratory research methods such as in-depth interviews uncover causal tendencies or generative mechanisms which suggest an informal link under certain situations and these links are not assured easily [92]. The probing questions, in-depth listening methods and existing knowledge are required to develop the cause and effect links which are raised during in-depth interviews and are considered important [77].

External validity describes the capability of the research results to be generalised beyond to the project scope [93]. For this purpose, the participants were selected for the in-depth interviewing process were chosen because of their knowledge, expertise, and leadership in this field of study, and their position in the industry influences many people [77].

Reliability is directly to the method's consistency to evaluate the data and to examine the reproduction and repetition of research by other researchers to draw similar conclusions [93]. Reliability can be authenticated by introducing a co-interviewer to validate cross checking and benchmarking. A second interviewer was not introduced because of the time and financial implications and because of the confidentiality of the participants' interviews would have been compromised [77]. Instead, the research supervisor associated an expert by forming a committee in order to monitor the process of the research [94].

Findings and Discussion

The main factors that impact the adoption of cloud computing in Australian regional municipal governments as identified by the participants based on their knowledge and experience as IT managers is presented in Figure (2). Each of these factors will be discussed next.
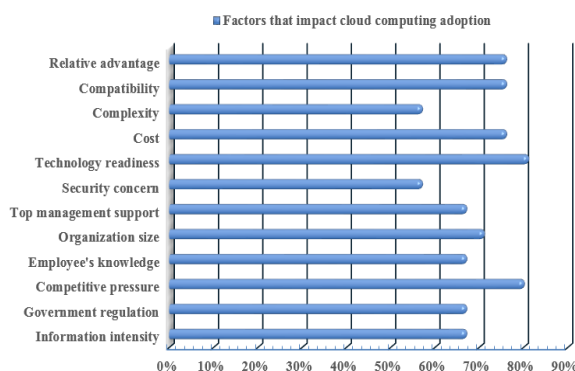

Figure 2: Factors that impact cloud computing adoption

Innovation characteristics impacting adoption

Certain innovation features of cloud computing inclusive of relative advantage, compatibility, and complexity influence the evaluation of participants' responses positively in accordance with the research. The feature of relative advantage influences 16 occurrences from the responses or about 76% of the sample population even the compatibility has same effects as the relative advantage. The complexity feature influences 57% of the sample population while impacting 12 responses positively. These innovation characteristics will be explored in the next section.

Relative Advantage: As described by some researchers, when the organization realizes a specific innovation that has the potentiality of relative advantage then it has more chances to take on that innovation then there is a great possibility of rising up of the adoption [69][95][96]. Many of the previous studies have demonstrated the investigation carried out on the impact of relative advantage over the adoption of new innovation [69][94][97][98][99]. Cloud computing proposes a number of benefits associated with the flexibility, reliability, and capacity [30]. The relative advantage influences the adoption of cloud computing positively in this research. Nevertheless, two basic reasons, for the advantages of cloud computing, have been drawn from the responses of participants which are as follows:
It has the capability to provide with the advantages in regard with delivering better services.
It reduces the risks level and costs on the whole when contrasted with the costs of other competitors and technologies.

However, some of the participants were not clear in the mind for the positive or negative effects of relative advantage when the cloud computing is considered and adopted. On the whole, there were a total of four participants who were having doubts for the effect of new innovation of cloud computing as this technology is still developing while the effect is imprecise. There was merely one participant who was sure of negative effect of the relative advantage due to assorted elements responsible in the adoption of cloud computing.

Compatibility: In accordance with the opinions of reference [95][100], the adoption of cloud computing services are considered to show compatibility by the organizations. A number of authors have carried out research in order to elucidate the part of compatibility in cloud computing referring it as a significant determinant of IT innovation adoption [49][56][101][102][103]. On the basis of participants' responses the compatibility feature of cloud computing has a positive impact over the adoption of cloud computing which is due to the aforementioned consequences:
The positive impacts balance the negative results attained in the compatibility.
The organization will gain a number of huge benefits through compatibility feature.
On the other hand, certain participants were irresolute of the effect of compatibility in the cloud computing that it can have both the effects whether positive or negative. Due to the embryonic nature of the compatibility and different effect, three participants were uncertain of its effects while further two participants concluded that cloud computing is

influencing negatively due to the absence of compatibility in regional councils.

Complexity: The organizations may face challenges and difficulties which transforming the processes due to the adoption of new technology in which they intermingle with their business systems. Some researchers have elucidated this situation by stating that new technologies must be easy-to-use and accessible for amplifying the proportion of adoption [104][105]. The execution of cloud computing, complexity seemed to be an essential element as demonstrated in a number of studies [106][107][108]. In this research, complexity serves to have a positive effect concluded on the participants' responses and for this positivity; merely one reason was given:

The negative complexity results are offset by the positive effects.

On the contrary, the rest of nine participants give reasons for considering complexity as a negative element or they were indecisive of the outcomes acquired occurring or could be attained throughout the cloud computing. More five participants were certain about the negative impact of complexity as a number of matters are still required to be determined specifically at the time when complexity plays an important role in the cloud model.

Technological contexts impacting adoption

As per the research outcomes and meticulous evaluation of the participants' responses, the technological factors of cloud computing comprising of cost, technology readiness and security concern have a positive influence. About 76% of the total sample population and around 16 participants showed positive effect of cost while technology readiness had positive effect as per 81% of the total sample population or 17 participants. Another technological factor of security concern demonstrated positive impact by 12 participants' responses or 57% of the total sample population. However, these technological factors will be unearthed more subsequently.

Cost: As per the elucidation of some researchers, cloud services are now utilized by organizations to achieve the benefits such as cost saving which is the basic purpose of its exploitation [56][30]. The usage-based pricing model happens to be the reason of the enhanced financial gain. The cloud services if utilized by newly established organizations can assist them to reduce their capital expenditures and obstacles [29].The element of cost plays a pivotal role in the cloud computing in this research originated from the participants' responses and for this, they granted merely one explanation:

It tends to be cost- effective and facilitate organizations in decreasing their expenditure.

Moreover, the opinions of the remaining eight participants demonstrated positive impact of cost over the organization and the cloud model.

The cost element of cloud computing can have positive impact if the diminishing of cost is verified and reasonable.

As per the opinions of other three participants, there may be a negative effect of the cost of the cloud model and for this judgement; they said that it might become too expensive for adopting and transforming to cloud computing wholly. The other two participants tend to be doubtful of the effect of the cloud computing over organizations and accentuated over the need of more improvement and development in cloud computing along with the conduction of tests in order to show the accurate outcomes of the cloud computing cost.

Technological Readiness: The adoption of newly developed technology is influenced by the technological readiness of organizations, IT human resources and the technological infrastructure [55][71][109]. As per this research and participants' responses, the technological readiness demonstrates positive effect over the adoption of cloud computing which is because:

The consequence that advanced technology always demonstrates positive effect over organizations.

Conversely, there were a total of four participants who demonstrated uncertainty regarding the influence of technological readiness over cloud model and organization. The participants could not display assurance as there is a requirement for more verification and testing.

Security Concern: As described by reference [110], security is one of the major concerns seen in computer applications prominently as compared to other fields. The reference further commented that cloud computing provides both, computing in a joint multi-user atmosphere and storage and i.e. why security matters are crucial [110]. In this research, participants' responses, cloud computing tends to have a positive effect in regard with security and for this; two consequences were provided which are listed below:

Cloud computing provide with a more defensive atmosphere for data sharing.

In cloud computing, due to their regulations, security is not a concern.

Conversely, there were five participants who reported uncertainty regarding the cloud computing effect on the data privacy and security along with organization. The reason for these participant's ambiguity was the insufficient research and testing in the field of cloud computing.

Organizational contexts impacting adoption

As per a careful evaluation of participants' responses and the research, the organizational contexts of cloud computing such as top management support, organization size, and employees' knowledge have a positive effect. About 67% of the sample population and around 14 participants showed positive effect of top management while employees' knowledge had the similar positive effect as per 67% of the sample population or 14 participants. Another organizational context of adoption demonstrated positive impact by 15 participants' responses or 71% of the sample population. These organizational contexts will be unearthed more subsequently.

Top Management Support: In accordance with the opinions of some researchers, top management's attitudes and support has great power to cause a positive effect over the adoption of technology innovation headed for change [66][102]. Top management's support seems to play a very significant role in sustaining the essence of probable change by means of an eloquent vision and role model for the organization and through transmitting signals to employees of the organization in regard with the adoption of new

technological innovation for the attainment of goals [17]. As per this research and participants' responses, top management support influences the cloud computing adoption positively on the basis of the reason that:

If the top management willingly encourages cloud computing adoption then it can work over improving the organizational performance while providing with better services to the customer.

Nevertheless, the participants also demonstrated its negative effect in the form of two consequences mentioned below:

Top management, itself, is not fully aware of this technology of cloud computing.
There is a possibility of a negative effect of cloud computing as its benefits have not been verified until yet for the role of top management.

Moreover, there were certain participants who demonstrated ambiguity regarding the impact of cloud computing due to:
The deficiency of knowledge and awareness in top management regarding cloud computing.

Organization Size: It has long been at the heart of studies looking at IT innovation adoption and is considered to be an important predictor of IT innovation adoption [111][112]. More certain studies demonstrated positive association [100][113][114], whereas some demonstrated negative [115][116]. Moreover, there were certain studies which displayed it in the form of inconsequential association [117][118]. As per this research and participants' responses, organization size influences the cloud computing adoption positively on the basis of three consequences:
The bigger organizations influence positively due to the reason they comprise of the resources which help in the adoption of cloud computing.
The small-scale organizations have positive effect as they will attain flexibility in the adoption of a new technology.
The organizations have the capability to capitalise cloud computing showing positive effect.

On the contrary, the other participants responded negatively over this issue specifically in the opinion that the organization size can influence the execution of cloud computing as they deem that the benefits of cloud computing have not been yet verified and there is a lot of advancement to be done in this field. Moreover, there were certain participants who demonstrated ambiguity regarding the impact of cloud computing as there was no strong justification for the influence of organization's size on the adoption of new technology.

Employee's Knowledge: According to reference [53], stated that with the adoption of new innovation, the employees' adoption attitude can have the impact through the gathered experience. If we consider cloud computing in the form of new innovation then it actually depicts familiarity with technologies such as utility computing, cluster computing and virtualisation will directly impacts the discernments of employee in regard with cloud computing. A number of theorizers and researchers have stated that certain studies have showed that the previous experience plays a significant role in the adoption of new technology [70][119][120][121]. Employee's knowledge influences cloud computing

positively as illustrated through this research and participants' responses. They think it because of two consequences:
Knowledge of employees will be highly influenced with the adoption of cloud computing.
If employees have entire knowledge and apprehension of cloud computing then it can influence positively.

Conversely, there was a participant who was indecisive with the influence of employee's knowledge over the adoption of cloud computing. The participant commented that they were not sure with how employees' knowledge is related to cloud computing adoption. Furthermore, another participant was sure of the negative influence of employee's knowledge over cloud computing adoption due to the absence of firm verification and benefits.

Environmental contexts impacting adoption
Certain environmental contexts of cloud computing inclusive of competitive pressure, government regulation, and information intensity influence the evaluation of participants' responses positively in accordance with the research. The feature of information intensity influences 14 occurrences from the responses or about 67% of the sample population even the government regulation has same effects as the information intensity. However, the competitive pressure influences 80% of the sample population while impacting 17 responses positively. These environmental contexts will be explored next.

Competitive Pressure: This factor referred to the pressure level upon the organization occurring from the competitors present in the industry [17][71]. This pressure has a great significance as it serves to be an adoption driver as demonstrated by many previous empirical studies [98], while certain studies state that the competitive pressure does not impact the adoption decisions and thus cannot be termed as a significant element [122][123]. The factor of competitive pressure plays a pivotal role in the cloud computing in this research originated from the participants' responses and for this, they granted two explanations:
It influences positively if the stakeholders and the organizations themselves manage it appropriately, it will surely add to their benefits.
It refers to the source of innovation and development.

Moreover, the opinions of two participants demonstrated indistinctness of competitive pressure over the organization and the cloud model. They further said that the organization would have had positive impact if the organization had reached to the stated level of the cloud computing. The other two participants were having negative opinion regarding the adoption of cloud computing in regard with competitive pressure as they felt that not every organization has the capability to tackle the competitive pressure.

Government Regulation: This term implies the support attained from the authorities for the purpose of convincing an increase in the adoption of IS innovations [70]. Even the governments have the power to promote cloud computing adoption through formulating regulations in order to shield businesses by utilizing this system [56][63][70][71]. In this research, government regulation serves to have a positive effect concluded on the participants' responses and for this positivity; merely two important consequences were listed:

Regulations are formulated to ensure better system and process for the adoption demonstrating positive effect.

Effective and appropriate regulations' adoption also depicts positive effect.

On the contrary, four participants were uncertain of the positive or negative effect of government regulation over cloud computing as they believe that their organizations needs to develop more for acquiring the side stages of cloud computing while merely three participants suppose government regulations to effect negatively. Two of the three participants consider a number of factors required to have positive effect while the third one deemed that government may pressurize organization over the cloud computing adoption.

Information Intensity: This factor refers to the proportion of information at hand in the business service [69], and there are diverse information intensities in the diverse sectors of the organizations. Financial and health agents require latest information to work in their field stating the significance of information intensity in the decision of adoption [54][55] [69]. Information intensity serves to be the dependence of an organization over availing the latest, appropriate, consistent and precise information at the time when they need it [69]. Information intensity, in accordance with the opinions of participants and research evaluation, positively influences the adoption of cloud computing due to two consequences:

Cloud computing has the capability to grant up-to-date and appropriate information influencing information intensity positively.

Cloud computing has the ability to make best use of information intensity and thus influencing positively.

Moreover, there were a total of five participants who were indecisive in regard with the positive or negative effect as they believe that organizations have yet not reached to the side stages of cloud computing but two participants were sure of the negative effect as accessing information can formulate huge problems in the future.

Benefits of cloud computing adoption

The benefits of the technology that may play important role in the intention to adopt cloud computing, such as productivity [73][74]; efficiency [73][74]; reliability [11] [74][124], and reduce infrastructure [73][74]. In this research the most significant anticipated benefits that related to the adoption of cloud computing in Australian regional municipal governments are as following:

Providing better services to the organizations was the most significant benefit shared by the majority of the IT specialists interviewed. The benefits of better services entails to many different positive effects that cloud computing technology may bring. Some examples are reduced risks for the organizations and clients, having access over the data anytime and anywhere, and better management of services [125]. The first benefit of reduced risk referred to improved data protection for the clients upon transition to the cloud model. Next, participants pointed out that better service indicates that the staff and client may access their data and information anytime and anywhere. Finally, an overall enhanced service and management of data is promised and foreseen by the IT managers given that the benefits of the

cloud model will be maximized by the organizations and providers.

Cost reduction was the second benefit to the organizations [125]. Participants stated that cost reductions on operations by using cloud computing is anticipated. In addition, they believe that cloud computing will bring a reduced use of physical hardware system which will save a large portion of the financial resources for the organizations. Overall, participants had very similar views on how organizations will benefit by saving costs and managing their finances, which ensures productivity and sustainability in the long run.

Reduced IT infrastructure, this particular benefit is greatly connected to the reduced costs as previously discussed. The participants believed that one advantage would be the decreased utilization of IT infrastructure [125].

Remote access where participants shared that by utilizing cloud computing, organizations will then have access to the remote and rural areas which can in turn into greater advantages especially having a larger audience reach. The participants also noticed around the ability to move the requirement for supporting the backend infrastructure that is required of some systems out of the regional area and having that been able to be supported data centre in the major cities, where is the support maintenance around that staff is a part of agreement. There is less in local skills, where there is a shortage of those skills within regional and rural areas, for them to be able to support [125].

Time efficiency and management is also anticipated by the IT managers. With cloud computing all data and information is stored in one or organized sets of location therefore time market will be a lot quicker and more effective [125].

Reduce the level of risk, the participants stated that cloud computing can indicate a reduced level of risk. This can take effect as heightened protection and security is also expected once the cloud model works effectively for the organization and the stakeholders [125].

Reduce staff, the adoption of cloud computing is reduce IT infrastructure. As a result of reduce IT infrastructure most of the IT software, operations and functions done by a third party. There will be fewer in-house IT staff and lower costs [125].

The final benefit was *disaster recovery and backup*. Based on their responses, disaster recovery and backup entails to the ability of cloud computing to function despite the unexpected issues and problems that may arise along the way. Having proper data backup can provide a quick recovery in unexpected cases and times [125].

A comparative analysis of cloud adoption factors

As stated in the methodology, the interview data was reanalysed using Leximancer to enhance the reliability of the findings from the manual content analysis [84][85]. The first step it focused on the wide range of business-related words used by the respondents and identified from the exploratory Leximancer analysis [126]. The second step for analysing the data was to examine the thematic groupings [126]. Leximancer uses a natural language processing algorithm, so the theme is titled by the concept with highest prominence in

the thematic aggregation [126]. In this analysis, Leximancer clustered the concepts into six themes (cloud, data, information, impact, things, systems), each theme aggregating two or more concepts and represented by labelled circles as they have been illustrated in Figure (3). Figure (3) illustrates the IT managers' views of the factors that have impact on the intention to adopt cloud computing in Australian regional municipal governments. This figure depicts the central theme within the map was 'cloud', and being strongly linked to the themes data, information, impact, and things. The dominate theme cloud has strong associations with most other concepts on the map. Cloud is multifaceted in its use: relating to government, security, infrastructure, use, moving, and stuff. The concepts in the map such as computing, security, infrastructure, service, government, data, and organizations are shown to be frequently occurring and strongly connected to the theme cloud. Another theme illustrated but not connected to the theme 'cloud' include 'systems'. The centrality of this theme provides a starting point for the research analysis.
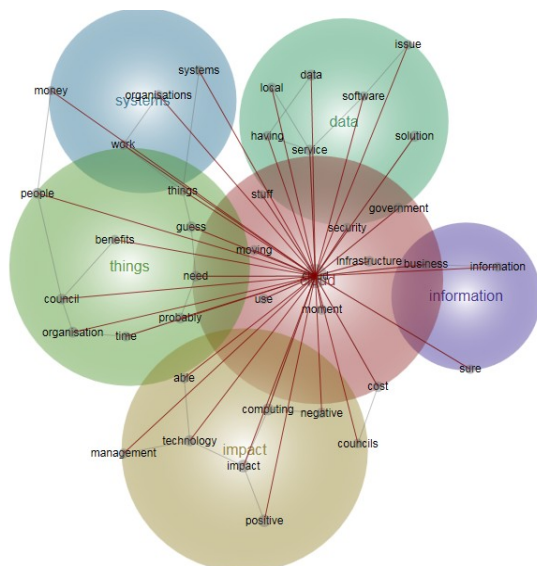

Figure 3: Cloud computing adoption factors key concepts map

Each concept from the previously discussed concept map has been depicted in a bar chart as shown in Figure (4). It was demonstrated by the IT managers that the top seven ranking concepts were computing, security, infrastructure, service, government, data, and organizations
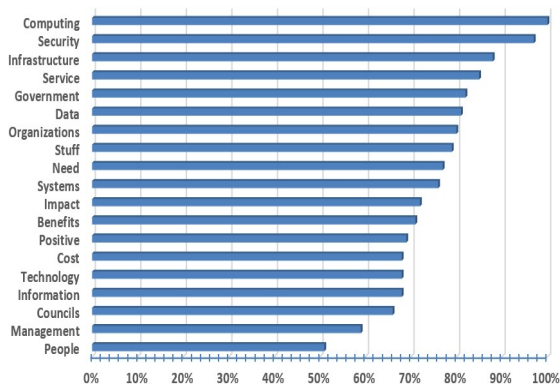

Figure 4: Concepts relevance

Because this research concentrated to find out the factors that have impact on the intention to adopt cloud computing in Australian regional municipal governments, the theme

'impact' which contains the concept 'positive' links strongly to the findings within the manual content analysis that suggested that IT managers saw cloud computing as having a positive impact on their organizations (See Figure 5).

The concept 'positive' and it's linkages on the concept map, through the analysis, have been illustrated through Figure (5). This concept is linked to all other concepts on the map. These linkages are to be expected with 'positive' being the top ranking concept. The strongest linkages shown in Figure (5) are: (a) between *positive* and *technology*, (b) between *positive* and *management*, (c) between *positive* and *cost,* (d) between *positive* and *information,* (e) between *positive* and *infrastructure*. These strengths are expected due to the focus of the research study and the qualitative questions asked, which were related to the factors that have impact on the intention to adopt cloud computing in Australian regional municipal governments.
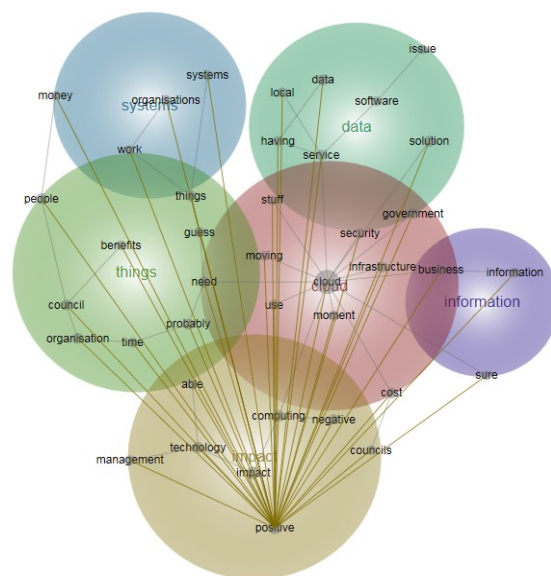

Figure 5: Positive impact and related linkages

When discussing the concept 'positive' the IT managers were referring to the positive impact of technology, management, cost, information, and infrastructure. In relation to the mentioned concepts Table (3) illustrate the representative quotes of each concept.

Table 3: Positive factors concepts and themes

Leximancer-derived concepts	Representative quotes	Theme
Technology	'About the technology readiness, in my opinion, our council system now ready to move to cloud. So, it is positive'.	Impact
Management	'For the top management support, it is definitely has positive impact on the decision to adopt any new technology'.	Impact
Cost	'Well I think it is, I mean, there definitely has positive. Yes, positive impact because the cost is going to be cheaper'.	Cloud
Infrastructure	'The relative advantages of cloud computing like; reduce IT infrastructure, reduce the level of the risk away from the councils as I mentioned that make positive impact to adopt this type of technology'.	Cloud
Government	'Government regulations have a positive impact. We help to comply with the government and there is risk management with our IT and a witness continuity plan and we do comply with those regulations after going to the cloud base'.	Cloud
Organization	'Organization size will be positive impact especially the smaller once; they are more flexible to move to adopt new technology'.	Systems
Benefits	'It would have to be some benefit to the organization to move down those technologies. If cost reduction is one of benefits, it is definitely a positive thing'.	Things
People	'knowledge, if they know the products that they are be going to use in the cloud solution, then that could be a positive effect like one of the big things have people are offering is the Office 365 package as part of the cloud solution'.	Things
Security	'If they got policy procedure and they tell you what they are using for their security platforms, then yeah, it is all cover under then will be positive - it all depends on the provider'.	Cloud
Information	'That would have a positive impact. Because cloud computing will provide our system with quick and good access to the information'.	Information
Solution	'Compatibility will be a positive impact because it can be a simple plight solution for a lot of businesses. Complexity, it should be simple as, if it is done competently and right by the provider of the cloud solution'.	Data

Through the analysis of the data it is clear that in the discussion of positive factors that impact the cloud computing adoption a number of aspects are addressed by IT managers. These aspects include positive impact of technology, management, cost, infrastructure, government, organization, benefits, people, security, information, and solution. After having a comparison between the results from Leximancer and the manual analysis, it was found by the researchers that both the methods gave the same result in a relation to the factors that have impact the intention to adopt cloud computing in Australian regional municipal governments.

Limitations and Future Research

This research expands our knowledge about the factors that affecting the adoption of cloud computing in Australian regional municipal governments. This research may be considered as an important contribution in the pursuit of fulfilling the knowledge about the factors that affecting the adoption of cloud computing. There has not been much research done on cloud computing adoption in reference to Australia and much more can be discovered. Future research could build on this research by examining the factors that affecting the cloud computing adoption in different sectors and industries. On a geographical dimension, this research was primarily limited to the regional municipal governments in Queensland. It may not be appropriate to generalize to the whole population of the regional municipal governments in Australia. For this reason, further empirical investigations in different regional municipal governments are needed.

Conclusion

The term cloud computing is a fundamental change in the way IT services are invented, developed, deployed, scaled, updated, maintained and paid for [11]. Based on the research questions and objectives, this research aims to explore and investigate the potential for value creation in Australian regional municipal governments by identifying factors that are likely to influence the adoption of cloud computing. The research model is proposed based on the TOE framework [52] and the DOI theory [49][53].

No previous research has drawn on technology innovation adoption theory that considers the innovation characteristics, technological, organizational and environmental contexts, and benefit characteristics that impact the adoption of cloud computing. It is evident that this research adds empirical weight to support previous findings. For example innovation characteristics included; relative advantage, compatibility, and complexity. Technological contexts included; cost, technology readiness, and security concern. Organizational contexts included; top management support, organization size, and employees' knowledge. Environmental contexts included; competitive pressure, government regulation support, and information intensity. Benefit characteristics included; better services, cost reduction, reduced IT infrastructure, remote access, and disaster recovery and backup.

The research provides empirical support for theories associated with traditional adoption of innovation [49][52] in better explaining the adoption of cloud computing. The results of the research are useful in providing a better understanding of how certain factors impact innovations adoption which may in turn lead to more informed managerial decision making processes regarding adoption of cloud computing systems. To conclude, our research design was exploratory, and further research is needed into each factor and level of analysis, as well as focusing on consistent theoretical lenses that consider innovation characteristics; technological, environmental and organizational contexts; benefit characteristics; so that a more integrated perspective on the complexities surrounding the adoption of cloud computing may be achieved. Furthermore, identifying correlating best practices to resolve these factors would be beneficial.

Compliance with Ethical Standards

Reference

[1] G. Cohen, Technology Transfer: Strategic Management in Developing Countries, Sage Publications, New Delhi, 2004.

[2] E.M. Roche, and M.J. Blaine, Information technology, development and policy, In: E.M. Roche, and M.J. Beaine (ed.), Information Technology, Development and Policy, Avebury, Alsershot, UK, 1996.

[3] O. Ali, and J. Soar, "Challenges and issues within cloud computing technology", *The Fifth International Conference on Cloud Computing, GRIDs, and Virtualization*, 2014, pp. 55-63.

[4] E. Baark, and R. Heeks, "Donor-funded information technology transfer projects: evaluating the life-cycle approach in four Chinese science and technology projects", *Information Technology for Development*, vol. 8, 1999, pp. 185-197.

[5] S. Venugopala, R. Buyyaa, C.S. Yeoa, J. Broberg, and I. Brandic, "Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility", *Future Generation Computer Systems,* vol. 25, no. 6, 2009, pp. 599-616.

[6] AGIMO, *Cloud Computing Strategic Direction Paper: Opportunities and applicability for use by the Australian Government*, Australian municipal government Information Management Office, Department of Finance and Deregulation, Canberra, ACT, 2011, accessed on 22/08/2013, available at: http://agimo.gov.au/files/2012/04/final_cloud_computing_strategy_version_1.pdf

[7] M. Creeger, "CTO round table: Cloud computing", *Communications of the ACM*, vol. 52, no. 8, 2009, pp. 50-56.

[8] W.M. Ryan, and C.M. Loeffler, "Insights into cloud computing", *Intellectual Property and Technology Law Journal,* vol. 22, no. 11, 2010, pp. 1-8.

[9] Wintergreen Research, *Worldwide Cloud Computing Market Opportunities and Segment Forecasts 2009 to 2016*, 2010, accessed on 17/11/2013, available at http://www.wintergreenresearch.com/reports/CloudOpportunities.htm

[10] O. Ali, J. Soar, and J. Yong, "Impact of cloud computing technology on e-government", *Information and Software Technologies*, vol. 456, 2014, pp. 272-290, Springer International Publishing.

[11] S. Marston, Z. Li, S. Bandyopadhyay, J. Zhang, and A. Ghalsasi, "Cloud computing: The business perspective", *Decision Support Systems*, vol. 51, no. 1, 2011, pp. 176-189.

[12] J. Baliga, R.W.A. Ayre, K. Hinton, and R.S. Tucker, "Green cloud computing: Balancing energy in processing, storage, and transport", *Proceedings of the IEEE*, vol. 99, no. 1, 2010, pp. 149-167.

[13] N. Sultan, "Cloud computing for education: A new dawn?", *International Journal of Information Management*, vol. 30, no. 2, 2010, pp. 109-116.

[14] W. Cellary, and S. Strykowski, "E-government based on cloud computing and service-oriented architecture", *ACM International Conference Proceedings Series*, 2009, pp. 5-10.

[15] H. Barwick, *Cloud Computing Adoption Increases in Australia*", *IDC*, 2013, accessed on 24/08/2013, available at: http://www.cio.com.au/article/520964/cloud_computing_adoption_increases_australia_idc

[16] M. Bailey, "Opportunities in private cloud computing via a Turnkey approach", *White paper*, 2011, pp. 1-6.

[17] C. Low, Y. Chen, and M. Wu, "Understanding the determinants of cloud computing adoption", *Industrial Management and Data Systems*, vol. 11, 2011, pp.1006-1023.

[18] C.S. Misra, and A. Mondal, "Identification of a company's suitability for the adoption of cloud computing and modelling its corresponding Return on Investment", *Mathematical and Computer Modelling*, vol. 53, 2011, pp. 504-521.

[19] Department on Innovation Industry Science and Research, Cloud Computing- Opportunities and Challenges, *IT Industry Innovation Council*, 2011, pp. 1-31.

[20] M. Kantarcioglu, A. Bensoussan, and S.R. Hoe, "Impact of security risks on cloud computing adoption", *Forty-Ninth Annual Allerton Conference*, Allerton House, UIUC, Illinois, USA, 2011, pp. 670-674.

[21] D. Catteddu, and G. Hogben, "Cloud computing: Benefits, risks and recommendations for information security", *European Network and Information Security Agency*, 2009, pp. 1-125.

[22] NIST, "Cloud Computing", Computer Security Resource Centre, 2009, accessed on October 27, 2013, available at: http://csrc.nist.gov/groups/SNS/cloudcomputing/.

[23] J. Broberg, R. Buyya, and A. Goscinski, Cloud Computing: Principles and Paradigms, Wiley Press, USA, 2011.

[24] P. Mell, and T. Grance, "Draft NIST working definition of cloud computing", vol. 15, 2009, pp, 1-7.

[25] P.A. Dustin-Amrhein, A. De Andrade, E.A.B. Armstrong, J. Bartlett, R. Bruklis, and K. Cameron, "Cloud computing use cases", *White Paper*, version 3.0 ed., 2010, pp. 1-7.

[26] LGAQ, "Digital Productivity Report", *Local Government Association Queensland*, 2013, pp. 1-36.

[27] I. Saeed, G. Juell-Skielse, and E. Uppström, "Cloud enterprise resource planning adoption: Motives and barriers", *International Conference on Research and Practical Issues of Enterprise Information Systems*, 2011, pp. 99-122.

[28] B. Beaubouef, *Cloud can bring out the best of ERP*, 2011, accessed on 29/11/2013, available at: http://gbeaubouef.wordpress.com/2011/11/23/cloud-erp-advantage/.

[29] R.L. Grossman, and Y. Gu, "On the Varieties of Clouds for Data Intensive Computing", *Data Engineering*, 2009, p. 44.

[30] M. Miller, *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*, Que, Indiana, IN, 2008.

[31] N. Leavitt, "Is cloud computing really ready for prime time?", *Computer*, vol. 42, no. 1, 2009, pp. 15-20.

[32] B. Melvin, and J. Greer, *Software as a Service Inflection Point: Using Cloud Computing to Achieve Business Agility*. iUniverse Star, 2009.

[33] W. Wu, L.W. Lan, and Y.T. Lee, "Exploring decisive factors affecting an organization's SaaS adoption: A case study", *International Journal of Information Management*, 2011, pp. 1-8.

[34] S. Bhardwaj, L. Jain, and S. Jain, "Cloud computing: A study of infrastructure as a service (IaaS)", *International Journal of Engineering and Information Technology*, vol. 2, no. 1, 2010, pp. 60-63.

[35] W. Kim, "Cloud computing adoption", *International Journal of Web and Grid Services*, vol. 7, no. 3, 2011, pp. 1-10.

[36] J. Repschlaeger, S. Wind, R. Zarnekow, and K. Turowski, "A reference guide to cloud computing dimensions: Infrastructure as a Service classification framework", *The 45th Hawaii International Conference on System Sciences*, 2012, pp. 1-10.

[37] P. Banerjee, "An intelligent IT infrastructure for the future", *Proceedings of 15th International Symposium on High-performance Computer Architecture*, Raleigh, NC, USA, 2009.

[38] F. Doelitzscher, A. Sulistio, C. Reich, C. Kuijs, and D. Wolf, "Private cloud for collaboration and e-Learning services: from IaaS to SaaS", *Computing*, 2011, pp. 23-42.

[39] T. Behrand, E.N. Wiebe, J.E. London, and E.C. Johnson, "Cloud computing adoption and usage in community colleges", *Behaviour and Information Technology*, vol. 30, no. 2, 2010, pp. 231-240.

[40] R. Buyya, C.S. Yeo, S. Venugopa, J. Broberg, and I. Brandic, "Cloud computing and emerging it platforms: vision, hype, and reality for delivering computing as the 5th utility", *Future Generation Computer Systems*, vol. 25, 2009, pp. 599-616.

[41] Q. Liu, Cloud computing in construction: An investigation into the potential implementation of cloud computing in China construction industry to mitigate traditional IT application issues, Heriot-Watt University, 2011.

[42] S. Biggs, and S. Vidalis, "Cloud computing: The impact on digital forensic investigations", *International Conference for Internet Technology and Secured Transactions*, 2009, pp. 1-6.

[43] T. Borangiu, A. Curaj, and A. Dogar, "Fostering innovation in services through open education and advanced IT", *International Joint Conference on Computational Cybernetics and Technical Informatics*, 2010, pp. 437-444.

[44] A. Talukder, S. Gandham, H. Prahalad, and N. Bhattacharyya, "Cloud-MAQ: The cloud-enabled scalable whole genome reference assembly application", *The 7th International Conference on Wireless and Optical Communications Networks*, 2010, pp. 1-5.

[45] R.L. Grossman, "The case for cloud computing", *IEEE Computer Society*, 2009, pp. 23-27.

[46] F. Damanpour, "Organizational innovation: A meta-analysis of effects of determinants and moderators", *The Academy of Management Journal*, vol. 34, no. 3, 1991, pp. 555-590.

[47] M. Lind, and R. Zmud, "The influence of a convergence in understanding between technology providers and users of information technology innovativeness", *Organization Science*, vol. 2, no. 2, 1991, pp. 195-217.

[48] C. Slappendel, "Perspectives on innovation in organizations", *Organization Studies*, vol. 17, no. 1, 1996, pp. 107-129.

[49] E. Rogers, Diffusion of Innovations, 5th (ed.), Free Press, New York, NY, 2003.

[50] G. Zaltman, R. Duncan, and J. Holbek, *Innovations & organizations*, R.E. Krieger Pub. Co, 1973.

[51] A.H. Van De Ven, and E.M. Rogers, "Innovations and organizations", *Communication Research*, vol. 15, no. 5, 1988, pp. 632-651.

[52] L. Tornatzky, and M. Fleischer, The Process of Technology Innovation, Lexington, MA, 1990.

[53] E.M. Rogers, Diffusion of Innovations 4th (ed.), New York, Free Press, 1995.

[54] A.Y.L. Chong, K.B. Ooi, B.S. Lin, and M. Raman, "Factors affecting the adoption level of e-commerce: An empirical study", *Journal of Computer Information Systems*, vol. 50, no. 2, 2009, pp. 13-22.

[55] Y.M. Wang, Y.S. Wang, and Y.F. Yang, "Understanding the determinants of RFID adoption in the manufacturing industry", *Technological Forecasting and Social Change*, vol. 77, 2010, pp. 803-815.

[56] K. Zhu, S. Dong, S. Xu, and K. Kraemer, "Innovation diffusion in global contexts: Determinants of post-adoption digital transformation of

European companies", *European Journal of Information Systems*, vol. 15, no. 6, 2006, pp. 601-616.

[57] T. Oliveira, and M.F. Martins, "Understanding e-business adoption across industries in European countries", *Industrial Management and Data System,* vol. 110, no. 9, 2011, pp. 1337-1354.

[58] G. Rui, "*Information Systems Innovation Adoption among Organizations a Match-Based Framework and Empirical Studies*", National University of Singapore, Singapore, 2007.

[59] H.F. Lin, and S.M. Lin, "Determinants of e-business diffusion: A test of the technology diffusion perspective", *Tech-novation,* vol. 28, no. 3, 2008, 2008, pp. 135-145.

[60] O.K. Lee, M. Wang, K.H. Lim, and Z. Peng, "Knowledge management systems diffusion in Chinese enterprises: A multistage approach using the technology-organization-environment framework", *Journal of Global Information Management,* vol. 17, no. 1, 2009, pp. 70-84.

[61] M. Martins, and T. Oliveira, "Determinants of e-commerce adoption by small firms in Portugal", *Proceedings of the 3rd European conference on information management and evaluation*, 2009, pp 328-338.

[62] T.S.H. Teo, C. Ranganathan, and J. Dhaliwal, "Key dimensions of inhibitors for the deployment of web-based business-to-business electronic commerce", *IEEE Transactions on Engineering Management*, vol. 53, no. 3, 2006, pp. 395-411.

[63] K. Zhu, and K.L. Kraemer, "Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry", *Information Systems Research,* vol. 16, no. 1, 2005, pp. 61-84.

[64] M. Bradford, and J. Florin, "Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems", *International Journal of Accounting Information Systems*, vol. 4, no. 3, 2003, pp. 205-225.

[65] R. Cooper, and R. Zmud, "Information technology implementation research: a technological diffusion approach", *Management Science,* vol. 36, no. 2, 1990, pp. 123-139.

[66] L. Eder, and M. Igbaria, "Determinants of intranet diffusion and infusion", *Omega*, vol. 29, no. 3, 2001, pp. 233-242.

[67] P.F. Hsu, K.L. Kraemer, and D. Dunkle, "Determinants of e-business use in us firms", *International Journal of Electronic Commerce*, vol. 10, no. 4, 2006, pp. 9-45.

[68] Y.H. Li, "An empirical investigation on the determinants of e-procurement adoption in Chinese manufacturing enterprises", *International Conference on Management Science and Engineering* (15th), California, USA, vol. I and II, 2008, pp. 32-37.

[69] J. Thong, "An integrated model of information systems adoption in small businesses", *Journal of Management Information Systems*, vol. 15, no. 4, 1999, pp. 187-214.

[70] K. Kuan, and P. Chau, "A perception-based model for EDI adoption in small businesses using a technology-organization-environment framework", *Information and Management*, vol. 38, no. 8, 2001, pp. 507-521.

[71] T. Oliveira, and Martins, M. "Literature review of information technology adoption models at firm level", *The Electronic Journal Information Systems Evaluation*, vol. 14, no. 1, 2010, pp. 110-121.

[72] N. Melville, and R. Ramirez, "Information technology innovation diffusion: An information requirements paradigm", *Information Systems Journal*, vol. 18, no. 3, 2008, pp. 247-273.

[73] A. Aljabre, "Cloud computing for increased business value", *International Journal of Business and Social Science*, vol. 3, no. 1, 2012, pp. 234-239.

[74] W. Kim, S.D. Kim, E. Lee, and S. Lee, "Adoption issues for cloud computing", *7th International Conference on Advances in Mobile Computing and 49 Multimedia*, New York, USA, ACM Press, 2009, pp. 1-2.

[75] L.J. Kirsch, "Deploying common systems globally: The dynamics of control", *Information Systems Research,* vol. 15, no. 4, 2004, pp. 374-395.

[76] G. Gaskell, "Individual and group interviewing", in M. Bauer, and G. Gaskell, (ed.), *Qualitative researching with text, image and sound*, Sage, London, 2000.

[77] D. Carson, A. Gilmore, C. Perry, and K. Gronhaug, K. *Qualitative Marketing Research*, Sage Publications, London, 2001.

[78] M.B. Miles, and M. Huberman, *Qualitative Data Analysis*, Sage Publication, Newbury Park, 1984.

[79] D. Faust, "A needed component in prescription of science: Empirical knowledge of human cognitive limitations', *Knowledge*, vol. 3, 1982, pp. 555-570.

[80] H.F. Hsieh, and S.E. Shannon, "Three approaches to qualitative content analysis", *Qualitative Health Research, vol.15, no.* 9, 2005, pp. 1277-1288.

[81] S. Rao, and C. Perry, Convergent interviewing: a starting methodology for an enterprise research program, in D. Hine, and D. Carson, (ed.), *Innovative Methodologies in Enterprise Research*, Edward Elgar, Northampton, Massachusetts, 2007.

[82] J. Schilling, "On the pragmatics of qualitative assessment: Designing the process for content analysis', *European Journal of Psychological Assessment,* vol. 22, no. 1, 2006, PP. 28-37.

[83] M.Q. Patton, *Qualitative Research and Evaluation Methods,* Thousand Oaks, CA: Sage Publications, 2002.

[84] S. Middleton, P.W. Liesch, and J. Steen, "Organizing time: Internationalization narratives of executive managers", *International Business Review*, vol. 20, no. 2, 2011, pp. 136-150.

[85] A.E. Smith, and M.S. Humphreys, "Evaluation of unsupervised semantic mapping of natural language with Leximancer concept mapping", *Behaviour Research Methods*, vol. 38, no. 2, 2006, pp. 262-279.

[86] A.E. Smith, "Automatic extraction of semantic networks from text using Leximancer", Paper presented at the North American Chapter of the Association for Computational Linguistics - Human Language Technologies, Edmonton, Canada, 2003.

[87] S. Cummings, and U. Daellenbach, "A guide to the future of strategy? The history of long range planning", *Long Range Planning*, vol. 42, no. 2, 2009, pp. 234-263.

[88] D. Silverman, *Doing Qualitative Research: A practical handbook*, Sage Publications, London, 2000.S.

[89] Rao, and C. Perry, "Convergent interviewing to build a theory in under-researched areas: Principles and an example investigation of Internet usage in inter-firm relationship", *Qualitative Market Research*, vol. 6, no. 4, 2003, pp. 236-247.

[90] R. Yin, *Case Study Research, Design and Methods*, Sage Publications, Beverley Hills, 2009.

[91] W.G. Zikmund, *Business Research Methods*, Harcourt Inc, USA, 2000.

[92] C. Perry, A. Riege, and L. Brown, "Realism's role among scientific paradigms in marketing research", *Irish Marketing Review*, vol. 12, no. 2, 1999, pp. 16-23.

[93] U. Sekaran, *Research Methods for Business: Skill-Building Approach*, John Wiley and Sons, New York, 2000.

[94] E.G. Guba, and Y.S. Lincoln, Competing paradigms in qualitative research, In: N.K. Denzin, and Y.S. Lincoln, (ed.), Qualitative Research, Thousand Oaks, CA: Sage, 1994, pp. 105-117.

[95] J. Lee, "Discriminant analysis of technology adoption behaviour: A case of internet technologies in small businesses", *Journal of Computer Information Systems*, vol. 44, no. 4, 2004, pp. 57-66.

[96] J. Thong, C. Yap, and K. Raman, "Engagement of external expertise in information systems implementation", *Journal of Management Information Systems*, vol. 11, no. 2, 1994, pp. 209-231.

[97] J. Gibbs, and K. Kraemer, "A cross-country investigation of the determinants of scope of e-commerce use: an institutional approach", *Electronic Markets*, vol. 14, no. 2, 2004, pp. 124-137.

[98] C. Iacovou, I. Benbasat, and A. Dexter, "Electronic data interchange and small organizations: Adoption and impact of technology", *Management Information Systems Quarterly*, vol. 19, no. 4, 1995, pp. 465-485.

[99] G. Premkumar, and W.R. King, "Organizational characteristics and information systems planning: An empirical study", *Information Systems Research*, vol. 5, no. 2, 1994, pp. 75-109.

[100] M. Kamal, "IT innovation adoption in the government sector: identifying the critical success factors", *Journal of Enterprise Information Management*, vol. 19, no. 2, 2006, pp. 192-222.

[101] H.L. Ching, and P. Ellis, "Marketing in cyberspace: what factors drive e-commerce adoption?", *Journal of Marketing Management*, vol. 20, no 3-4, 2004, pp. 409-429.

[102] N. Daylami, T. Ryan, L. Olfman, and C. Shayo, "System sciences", *Proceedings of the 38th Annual Hawaii International Conference (HICSS)*, Island of Hawaii, 2005, pp. 1-10.

[103] G. Premkumar, and M. Roberts, "Adoption of new information technologies in rural small businesses", *Omega*, vol. 27, no. 4, 1999, pp. 467-484.

[104] A. Parisot, Technology and Teaching: The Adoption and Diffusion of Technological Innovations by a Community College Faculty, Montana State University, Bozeman, MT, 1995.

[105] I. Sahin, "Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory", *The Turkish Online Journal of Educational Technology*, vol. 5, no. 2, 2006, pp. 14-23.

[106] A. Chaudhury, and P. Bharati, "IT outsourcing adoption by small and medium enterprises: A diffusion innovation approach", *Proceedings of the Americas Conference on Information Systems (AMCIS)*, 2008, pp. 14-17.

[107] G. Harindranath, R. Dyerson, and D. Barnes, "ICT in small firms: Factors affecting the adoption and use of ICT in Southeast England SMEs", *Proceedings in European Conference on Information Systems*, ECIS, 2008.

[108] A. Tiwana, and A. Bush, "A comparison of transaction cost, agency, and knowledge based predictors of IT outsourcing decisions: A US-Japan cross-cultural field study", *Journal of Management Information Systems*, vol. 24, no. 1, 2007, pp. 259-300.

[109] M.L. To, and E.W.T. Ngai, "Predicting the organizational adoption of B2C e-commerce: An empirical study", *Industrial Management and Data Systems*, vol. 106, 2006, pp. 1133-1147.

[110] R. Schneiderman, "For Cloud Computing, the Sky Is the Limit", Signal Processing Magazine, *IEEE*, vol. 28, 2011, pp.15-18.

[111] A. Jeyaraj, J.W. Rottman, and M.C. Lacity, "A review of the predictors, linkages, and biases in IT innovation adoption research', *Journal of Information Technology*, vol. 21, no. 1, 2006, pp. 1-23.

[112] G. Lee, and W. Xia, "Organizational size and IT innovation adoption: A meta-analysis", *Information Management*, vol. 43, no. 8, 2006, pp. 975-985.

[113] A. Mahler, and E. Rogers, "The diffusion of interactive communication innovations and the critical mass: The adoption of telecommunications services by German banks", *Telecommunications Policy*, vol. 23, no 10-11, 1999, pp. 719-740.

[114] B. Ramdani, and P. Kawalek, "SME adoption of enterprise systems in the northwest of England: An environmental, technological and organizational perspective", in T. McMaster, (Ed.), IFIP WG 8.6 – Organizational Dynamics of Technology-Based Innovation: Diversifying the Research Agenda, *Springer*, Boston, 2007, pp. 409-430.

[115] S. Goode, and K. Stevens, "An analysis of the business characteristics of adopters and non-adopters of World Wide Web technology", *Information Technology and Management*, vol. 11, no. 2, 2000, pp. 129-154.

[116] J. Utterback, "Innovation in industry and the diffusion of technology", *Science*, vol. 183, no. 2, 1974, pp. 620-626.

[117] M. Aiken, S.B. Bacharach, and J.L. French, "Organizational structure, work process, and proposal making in administrative bureaucracies', *The Academy of Management Journal*, vol. 23, no. 4, 1980, pp. 631-652.

[118] G. Varun, and M. Goslar, "The initiation, adoption, and implementation of telecommunications technologies in US organizations", *Journal of Management Information Systems*, vol. 10, no. 1, 1993, pp. 141-163.

[119] G.K. Hunter, Sales Technology, Relationship-Forging Tasks, and Sales Performance in Business Markets', The University of North Carolina, Chapel Hill, NC, 1999.

[120] M. Igbaria, T. Guimaraes, and G.B. Davis, "Testing the determinants of microcomputer usage via a structural equation model', *Journal of Management Information Systems*, vol. 11, no. 4, 1995, pp. 87-114.

[121] S. Lippert, and H. Forman, "Utilization of information technology: examining cognitive and experiential factors of post-adoption behaviour", *IEEE Transactions on Engineering Management*, vol. 52, no. 3, 2005, pp. 363-381.

[122] C. Crook, and R. Kumar, "Electronic data interchange: A multi-industry investigation using grounded theory", *Information and Management*, vol. 34, no. 2, 1998, pp. 75-89.

[123] V. Grover, "An empirically derived model for the adoption of customer-based Inter-organizational systems", *Decision Sciences*, vol. 24, no. 3, 1993, pp. 603-640.

[124] C. Heinle, and J. Strebel, "IaaS adoption determinants in enterprises", *Economics of Grids, Clouds, Systems, and Services*, Springer, 2010, pp. 93-104.

[125] O. Ali, J. Soar, H. McClymont, J. Yong, and Biswas, J, "Anticipated benefits of cloud computing adoption in Australian regional municipal governments: An exploratory study", *Pacific Asia Conference on Information Systems*, 2015, pp. 1-17.

[126] M.L. Verreynne, P. Parker, " Employment systems in small firms: A multilevel analysis", International Small Business Journal, 2011, pp. 1-27.