AN INVESTIGATION OF ANTICIPATED BENEFITS OF CLOUD COMPUTING ADOPTION IN AUSTRALIAN REGIONAL MUNICIPAL GOVERNMENTS

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Abstract
It is expected that computing services will increasingly be accessed as another utility a similar way to other services such as water, electricity, telephone or gas. Many organizations including government deliver their services through information and communication technology (ICT) tools including e-government. Cloud computing is a relatively new way of providing services over the internet. In this research in-depth interviews of Australian councils’ IT managers were conducted with the aim of providing insights into the perceived benefits of cloud computing adoption. Also, survey data from 480 IT staff across 47 local councils were collected to confirm the findings of the exploratory stage. The research indicated that cloud computing is seen to offer many benefits that are identified in the research literature; additional anticipated benefits emerged which related to reduced level of risk, remote access, reduce staff, and time efficiencies. The findings of this research may help IT managers and top management evaluate possible adoption by increasing their understanding about anticipated benefit which will encourage them when planning or decided to adopt cloud computing.

Keywords: Cloud computing, anticipated benefits, adoption, e-government, local councils.

INTRODUCTION
The implementation of information and communication technology (ICTs) strategies, such as electronic services, by organizations has allowed them to benefit both economically and competitively (DTI 2004; Pan & Jang 2008: Sultan 2010). Governments in particular are increasingly delivering their services electronically through electronic government systems (e-government) (Pyke 2009; Tuncay 2010). This simplifies the interaction between people and government organizations (Jansen 2005); and offers reliability, affordability and ease of maintenance (Jansen 2005; Smitha et al. 2012).

An efficient application of e-government is possible through cloud computing (Gosinski & Brock 2010; Tuncay 2010). It can save on the overall costs and is a novel method of providing services over the internet (Armbrush et al. 2010; Dillon et al. 2010; Leavitt 2009; Leimeister et al. 2010; Lyrer & Henderson 2010; Salleh et al. 2012; Zhang et al. 2010). Several benefits are provided by cloud based e-government in the form of cost reductions, enhanced storage, security management, scalability and accountability (Hayes 2008; Mell & Grance 2009). Cloud computing may be the main way organization will manage information processing in the future (Grossman 2009; Marston et al. 2011; Melvin & Greer 2009; West 2011).

Research about the use of cloud computing in the public sector in general is limited (Janssen & John 2011). Some previous researchers have studied the benefits of cloud computing in a relation to the cost (Buyya et al. 2008; Buyya et al. 2009; Kondo et al. 2009), green technology (Baliga 2010; Marston et al. 2011; Tripathi & Parihar 2011; Zhang et al. 2010), infrastructure (Das et al. 2011; Lenart 2011; Marston et al. 2011). There is a lack of exploratory studies that provide an in-depth and holistic investigation of all actual anticipated benefits of adopting cloud computing (Low et al. 2011; Misra & Mondal 2011). That is, we could not find any studies that listed all benefits and explained why and how they are benefits.

Despite its potential benefits the adoption rate of cloud computing in regional municipal government sectors in Australia has been lower compared to urban areas (IT Industry Innovation Council 2011). The paucity of empirical studies about anticipated benefits of cloud computing adoption in Australian regional municipal governments has hindered understanding and thus strategy development to improve its adoption (IT Industry Innovation Council 2011). This situation has prompted regional municipal governments to request further research to guide their implementation decisions (Department of Innovation Industry Science and Research 2011). The current gap in the literature has led us to the following research problem: What are the actual benefits of adopting cloud computing to Australian regional municipal government.

The paper was provides an overview about the research topic and the literature. Then, explain the methodology used to collect data for this research involved in-depth interviews with IT managers in Australian regional councils and survey data from 480 IT staff across 47 regional councils. Finally, the paper discusses findings limitations and suggestions for future research.

CLOUD AND GOVERNMENT
A broad and beneficial perspective into the computing world is provided by the various computing paradigms such as, cluster computing, grid computing and cloud computing...
(Armbrust et al. 2010; Buyya et al. 2009). Cloud computing involves computing resource services, software applications of distributed systems and data storage that provides a diversion from the usual paradigms (Armbrust et al. 2010). A new and evolving paradigm is provided by the cloud based e-government for the distributed computing of e-government applications that use services as the core for the flexible networks to integrate applications within and across government borders (Liang et al. 2011; Saeed et al. 2011; Zhang & Pi 2014).


By contrast, cloud computing offers several benefits to e-government (Ali et al. 2014; Smitha et al. 2012), some of these benefits are as:

Protection, care and technical support: The service providers of cloud computing provide access to applications and data services. The uniqueness of cloud system pertaining to e-government services is that the system is efficient enough to sort out problems particularly for government departments outside of urban areas where recruitment of IT staff is more difficult (Cellary & Strykowski 2006). Cloud service providers are accountable for upgrading software and providing technical assistance (Ali et al. 2014; Beaubouef 2011). Cloud technology, makes it easier to upgrade software applications, located in a single system (Cellary & Strykowski 2009; Marks & Lozano 2010; Rajkumar et al. 2011; Staten 2011). This further leads to minimize the total cost (Cellary & Strykowski 2009; Hashemi et al. 2013; Rastogi 2010; Tripathi & Parihar 2011).

Disaster recovery: A disaster recovery system is essential, a government can maintain a backup of the server using a cloud system for the disaster recovery on a day-to-day basis and can store it off-site through implementing a third party storage service provider that holds the ability to store in a different location (Hashemi et al. 2013). Disaster recoveries schemes in cloud systems is a better choice compared to traditional disaster recovery programmes because it can restore data in a more prompt and swift manner (Ali et al. 2015; Rajkumar et al. 2011; Singh 2010); and because this swift recovery reduces the cost of the operation (Staten 2011).

Old technologies and migrating to new technologies: Some of the functions of data centres for e-government include the ability to implement diverse versions of the software, programs and security packages (Aveek & Rahman 2011). But changing an out-dated technology to a highly sophisticated one has traditionally been a complicated task (Pokharel & Park 2009). By contrast, cloud computing does not require upgrading from one version to another because multiple versions of the software can be operated simultaneously. This system can therefore offer greater flexibility and efficiency for e-government (Aveek & Rahman 2011; Cellary & Strykowski 2009; Pokharel & Park 2009; Sharma et al. 2012).

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

Promoting business development: Benefits can be obtained from cloud computing in order to improve businesses by lowering the overall cost of investment in ICT infrastructure (Lenart 2011; Pokharel & Park 2009; Salleh et al. 2012). Cloud computing allows users to undertake computations, obtain software applications, and provide data access and storage to end-users without the need to know the physical location and configuration of the system that delivers the services (Bakshi & Hemachandran 2011). Many other benefits of cloud computing have been outlined in different studies such as: simplified cost and consumption model, faster provisioning of systems and applications, right size to address business changes, ease of integration, highly secure infrastructure, and compliant facilities and processes (Bakshi & Hemachandran 2011).

Reduced IT infrastructure cost: One of the major benefits that businesses are expecting from using cloud services is cost saving (Ali et al. 2014, 2015; Lenart 2011; Miller 2008; Salleh et al. 2012). This financial benefit is expected mainly because of the usage-based pricing model. Start-up organizations can use cloud services to help them to decrease their capital expenses and hurdles to entry (Grossman & Gu 2009). Cloud computing provides almost direct access to shared computing resources and small and start-up businesses can launch new operations quickly with little to no upfront capital investment; this will assist with a faster time to market in many businesses (Lanman et al. 2011; Marston et al. 2011). Using software from the cloud will lead to a reasonable reduction in systems maintenance and updating requirements (West 2011). Clients will be able to reduce software updating and maintenance costs, by having most of the IT software, operations and functions undertaken by a third party.

Ease of use and flexibility: The interfaces of cloud applications use browser web based applications or windows based applications. Both interfaces tend to be intuitive and easy to use (Melvin & Greer 2009). Most cloud computing suppliers offer more flexible contract terms, which encourages firms to implement cloud services as needed to expand their businesses (Leavitt 2009). In addition to these significant characteristics of cloud
computing, there is the portability and accessibility feature, as the Internet is considered the backbone of the utilization idea, through which computing services are provided for clients through an active Internet connection. On-demand access to any application can be at any time from any location, provided the client has network access (Lanman et al. 2011). This can assist small businesses, which have a wide market and broad horizontal company operations, such as regional or international, to decrease external costs and make them less location dependent. Unfortunately, perceived complexity hinders adoption and realisation of benefits.

**Methodology**

The data collection of this research was conducted in two major phases. Phase 1 involved a qualitative investigation to understand the significant anticipated benefit of cloud computing adoption in Australian regional municipal governments. Phase 2 involved the use of quantitative questionnaire data to confirm the findings from the phase 1. The next two subsections describe the methods and results from two phases in detail.

### 1.1 Qualitative Investigation (Phase 1)

<table>
<thead>
<tr>
<th>Segments</th>
<th>Extra small</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
<th>Very large</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>25%</td>
</tr>
<tr>
<td>Resource</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>12%</td>
</tr>
<tr>
<td>Indigenous</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>17%</td>
</tr>
<tr>
<td>Rural/Remote</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>29%</td>
</tr>
<tr>
<td>South East QLD</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>9</strong></td>
<td><strong>9</strong></td>
<td><strong>9</strong></td>
<td><strong>9</strong></td>
<td><strong>24</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Source: Research data*

To improve the reliability of this research, the process explained by Kirsch (2004) was followed for collecting data. This process defines a set of procedures: firstly, identify and select the research issues, secondly, determine who to interview, and finally, determine how the interviews will be conducted.

The interviews lasted between 30 and 50 minutes. The interview questions were designed as open-ended questions to encourage the interviewees to provide answers that revealed their attitudes and perceptions relating to the research topic (Carson et al., 2001). A total of 24 interviews were carried out with IT managers of the chosen councils. The research reached the saturation level within the interview number 18, when the researcher noticed that, there 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 1). Only 21 interviews were used in this study. Three interviews were excluded from the analysis because it was discovered during the interview that these three IT managers did not come from an IT background and did not have any experience or knowledge related to cloud computing.

The first phase of this research is exploratory in nature seeking to investigate and provide a qualitative overview of the concepts relating to the anticipated benefits from the adoption of cloud computing in Australian regional councils.

**Data collection method.** A series of in-depth interviews were conducted between May 13, 2014 and August 12, 2014. These obtained inputs from 24 local government employees at senior management levels: IT Manager (10); IT Coordinator (4); Technical Director (2); Information Service Manager (2); IT Officer (1); IT Consultant (1); IT Network Manager (1); Chief Information Officer (CIO) (1); Enterprise Architecture Manager (1); and Team Leader ICT Operation (1). These occupational groups were selected based on the assumption that they represent key stakeholder groups likely to be responsible for planning and adoption of cloud computing for regional municipal governments.

The sample reflects the geographical spread and size classifications of regional municipal governments throughout Queensland (Coastal – 29%; Resource – 14%; Indigenous – 10%; Rural/Remote – 29%; South East Queensland – 18%) (See Table 1).

**Data analysis.** The interviews data was analysed using manual content analysis method (Miles & Huberman 1984), 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 (Faust 1982; Hsieh & Shannon 2005; Miles & Huberman 1984). After the completion of each interview session, the recorded interviews were immediately transcribed. Interview transcripts were reviewed to create summary sheets for every interview (Rao & Perry 2007). 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 (Patton 2002; Schilling 2006). 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 (Miles & Huberman 1984). Once manual coding was completed, the data was then reanalysed using Leximancer to improve the reliability of the findings (Middleton et al. 2011; Smith & Humphreys 2006).

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 (Smith 2003). It uses ontological relativity and dynamics to assemble bits of information to structure and evaluate concepts (Cummings & Daellenbach 2009). 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 (Cummings & Daellenbach 2009). Combined use of both manual and software analytical approaches provided a robust basis for clearly delineating concepts, themes and aggregate dimensions (Middleton et al. 2011; Smith & Humphreys 2006).

**Phase 1 Findings.** After the interview, the anticipated benefits of the adoption of cloud computing was given a rating of Important, Unimportant, Not sure by the respondents. The way the impact is rated will be in accordance to how the informants responded to them along with what was derived and collected from empirical sources. These rates were checked and accepted by the respondents after we sent our interviews’ findings to them. This allows us to categorize the cost impact according to their importance of impact for Australian regional municipal governments and present them accordingly. For more details see Table 2.

<table>
<thead>
<tr>
<th>Anticipated Benefit</th>
<th>Freq.</th>
<th>%</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide better services</td>
<td>15</td>
<td>71%</td>
<td>“We get the benefit of regular maintenance and update so you do not have an aging solution, maintaining currency can be an issue for council with the upgrades. And we suffer the service solution that all happens in the background of the main equipment. So that might be a benefit with the intensive functionality connected them previously” (C52-UMF).</td>
</tr>
<tr>
<td>Cost reduction</td>
<td>13</td>
<td>62%</td>
<td>“The major benefits to move to a cloud is, obviously, is going to be cost savings because you do not have to invest in big data centres, in any infrastructure, in the people to maintain that infrastructure or support the infrastructure and maintain the infrastructure, well like upgrading and depreciating” (C34-UFV).</td>
</tr>
<tr>
<td>Reduce IT infrastructure</td>
<td>12</td>
<td>57%</td>
<td>“The best benefits of adopting cloud computing in the organization is reduce IT infrastructure” (C72-URS).</td>
</tr>
<tr>
<td>Remote access</td>
<td>8</td>
<td>38%</td>
<td>“I guess one of the benefits is that to try and get the level of skilled IT workforce in remote and rural areas is significantly harder to get than in a capital city so I can see that there would be a benefit of cloud computing to leverage off those issues with getting those skilled workers to those regions” (C28-URS).</td>
</tr>
<tr>
<td>Disaster recovery and Backup</td>
<td>7</td>
<td>33%</td>
<td>“The ability of vendor to be able to look after the security side for things such as back-up from disaster recovery from rural and regional area. Back to the supplier, who would carry them out and as a part of the agreement, we need to make sure that they have proper disaster recovery mechanism in place as far as back-up and restore” (C61-URM).</td>
</tr>
<tr>
<td>Flexibility</td>
<td>5</td>
<td>24%</td>
<td>“One of the greatest benefits of cloud computing is the ability to access your data from anywhere and generally speaking in different devices as well” (C21-RTX).</td>
</tr>
<tr>
<td>Availability</td>
<td>5</td>
<td>24%</td>
<td>“Availability, it can be improved by having a probably architected and redundancy solutions and possibly speed too” (C39-URM).</td>
</tr>
<tr>
<td>Reduce staff</td>
<td>5</td>
<td>24%</td>
<td>“The other benefits would be that you would not need certain specialized people internally as in, possibly, database administrators, possibly network administrators. That could possibly reduce some costs” (C11-RAV).</td>
</tr>
<tr>
<td>Time efficiencies</td>
<td>4</td>
<td>19%</td>
<td>“All the benefits come around being able to arrange and use the software as a service and infrastructure as a service, that quick response bring the system quickly without spending much time or wait for service to arrive and installation of the processes” (C61-UMR).</td>
</tr>
<tr>
<td>Reduce level of risk</td>
<td>2</td>
<td>10%</td>
<td>“Basically, by moving stuff in the cloud, the biggest benefit by far is that there is reduced...or the risk is moved away from council in that we do not have to deal with the risk as such” (C15-RAL).</td>
</tr>
<tr>
<td>Storage capacity</td>
<td>1</td>
<td>5%</td>
<td>“The amount of data that we generate now, storage is becoming a problem and cloud computing obviously can relieve that and relieve council of the financial burden to provide that” (C25-RTM).</td>
</tr>
</tbody>
</table>

**Source:** Research data

**Comparative analysis.** As stated in the methodology, the interview data was reanalysed using Leximancer to enhance the reliability of the findings from the manual content analysis (Middleton et al. 2011; Smith & Humphreys 2006). The first step it focused on the wide range of business-related words used by the respondents and identified from the exploratory Leximancer analysis. The second step for analysing the data was to examine the thematic groupings. Leximancer uses a natural language processing algorithm, so the theme is titled by the concept with highest prominence in the thematic aggregation. In this analysis, Leximancer clustered the concepts into six
themes namely: cloud; benefits; data; hardware; need; and moment), each theme aggregating two or more concepts and represented by labelled circles as they have been illustrated in Figure (1). Figure (1) illustrates the IT managers’ views of anticipated benefits of the adoption of cloud computing in regional municipal governments. This figure depicts the central theme within the map was ‘cloud’, and being strongly linked to the themes benefits, data, and hardware. The dominate theme cloud has strong associations with most other concepts on the map. Cloud is multifaceted in its use: relating to infrastructure, services, cost, systems, ability, rural regional, people, time, computing, and community. The concepts community, computing, benefits, cost, service, and infrastructure are shown to be frequently occurring and strongly connected to the theme cloud. Other themes illustrated but not connected to the theme ‘cloud’ include ‘need’ and ‘moment’. The centrality of this theme provides a starting point for the research analysis.

Because this research concentrated to find out the anticipated benefits of the adoption of cloud computing in the regional and municipal governments, the theme ‘benefits’ which contains the concept ‘benefit’ links strongly to the findings within the manual content analysis that suggested that IT managers saw cloud computing as having anticipated benefits on their organizations as shown in Figure (1).

The concept ‘benefit’ and it’s linkages on the concept map, through the analysis, have been illustrated through Figure (1). This concept is linked to all other concepts on the map. These linkages are to be expected with ‘benefit’ being the top ranking concept. The strongest linkages shown in Figure (1) are: (a) between benefit and service, (b) between benefit and cost, (c) between benefit and disaster recovery, (d) between benefit and time, (e) between benefit and infrastructure. These strengths are expected due to the focus of the research study and the qualitative questions asked, which were related to the anticipated benefits of cloud computing adoption.

Through the analysis of the data it is clear that in the discussion of benefits a number of aspects are addressed by IT managers. These aspects include benefits of cost, infrastructure, services, disaster recovery, ability, staff, time, rural, regional, hardware, systems, software, and councils. 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 anticipated benefits of the adoption of cloud computing in regional municipal governments.

1.2 QUESTIONNAIRE SURVEY (PHASE 2)

The second phase of this research is confirmatory in nature seeking to confirm the findings from the exploratory stage relating to the anticipated benefits from the adoption of cloud computing in Australian regional councils.

Data collection. A questionnaire was selected as the instrument for the second phase of data collection in this research. A questionnaire provides quick, affordable, efficient, and relatively accurate means to procure data to fulfill several goals (Zikmund 2003; Zikmund et al. 2013). The questionnaire was developed based on the previous literature on technological and organizations studies and the findings from qualitative study (exploratory stage), we developed the questionnaire to empirically test the research question. Feedback on the initial questionnaire was obtained from six IT managers of local councils. Minor modification were made based on the comments received.

An important step for the improvement of the effectiveness of the questionnaire is to do a pilot study (Shaughnessy et al. 2012). A pilot study includes actually running the questionnaire to a similar sample of respondents, under the same conditions to those anticipated in the final running of the survey (Shaughnessy et al. 2012). Running a pilot study before the final one is the best way to explore and identify issues and improve the design of the research survey (Waters 2011). The survey was pretested by 30 IT managers, nine curtailed surveys were discarded and entire of 21 surveys that were submitted with a 70% response rate.

An online survey method was chosen because of the accessibility of the internet for all intended participants and the belief that participants would prefer this approach. In order to make the survey available 24/7, an online survey service provider was found and the online survey link was offered for 3 months from March 1, 2015 to May 31, 2015.

Data analysis. Queensland local councils, are key organizations that provide public services to the citizens, community organizations and businesses. The 77 local councils in Queensland have great dependence on IT innovation to provide their services (LGAQ 2013). This research focuses on these local councils and in particular the IT department of these local councils as the main part of the target population. The survey was distributed online to Queensland’s 77 councils through USQ’s Ad hoc Survey System. IT Managers from 47 local councils responded to the survey which represented a response rate of 61% as shown in Table 3.
### Table 3. Survey details

<table>
<thead>
<tr>
<th>Survey Details</th>
<th>No. of councils</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey received</td>
<td>47 Councils</td>
<td>61%</td>
</tr>
<tr>
<td>Survey not replied</td>
<td>30 Councils</td>
<td>39%</td>
</tr>
<tr>
<td>Total</td>
<td>77 Councils</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not Respondents Councils Details</th>
<th>No. of councils</th>
<th>Percent</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 Councils</td>
<td>12%</td>
<td>Because of government regulations</td>
<td></td>
</tr>
<tr>
<td>8 Councils</td>
<td>11%</td>
<td>Because their IT were outsourcing</td>
<td></td>
</tr>
<tr>
<td>13 Councils</td>
<td>16%</td>
<td>Because they did not reply to the survey</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Research data*

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

### Table 4. Respondents’ demographics

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Roles in the field of IT</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>238</td>
<td>50 %</td>
<td>49.6%</td>
<td></td>
</tr>
<tr>
<td>Systems development/ Analyst/ Programmer</td>
<td>138</td>
<td>28.8 %</td>
<td>78.3%</td>
<td></td>
</tr>
<tr>
<td>Operations/ Systems administrator/ User support</td>
<td>101</td>
<td>21 %</td>
<td>99.4%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>0.6 %</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>480</strong></td>
<td><strong>100 %</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge related to cloud computing</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No knowledge</td>
<td>5</td>
<td>1 %</td>
<td>1.0%</td>
</tr>
<tr>
<td>Little knowledge</td>
<td>106</td>
<td>22.1 %</td>
<td>24.2%</td>
</tr>
<tr>
<td>Some knowledge</td>
<td>111</td>
<td>23.1 %</td>
<td>73.8%</td>
</tr>
<tr>
<td>Good knowledge</td>
<td>238</td>
<td>49.6 %</td>
<td>95.8%</td>
</tr>
<tr>
<td>Excellent knowledge</td>
<td>20</td>
<td>4.2 %</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>480</strong></td>
<td><strong>100 %</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total years’ of experience with IT</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>12</td>
<td>2.5 %</td>
<td>2.5%</td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>95</td>
<td>19.8 %</td>
<td>22.3%</td>
</tr>
<tr>
<td>2-5 years</td>
<td>250</td>
<td>52.1 %</td>
<td>74.4%</td>
</tr>
<tr>
<td>6-10 years</td>
<td>111</td>
<td>23.1 %</td>
<td>97.5%</td>
</tr>
<tr>
<td>11-14 years</td>
<td>8</td>
<td>1.7 %</td>
<td>99.0%</td>
</tr>
<tr>
<td>More than 14 years</td>
<td>4</td>
<td>0.8 %</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>480</strong></td>
<td><strong>100 %</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Research data*

The demographic information consisted of three items: role in the field of IT, knowledge in relation to cloud computing, and total years’ experience with cloud computing. Most of the participants were in an IT management role (49.6%), followed by 28.8% were in systems development/analyst/programmer roles, and 21% were in IT as operations/systems administrator/user support roles. Regard to their knowledge related to cloud computing, the results indicated that the highest knowledgeable level, which is “good knowledge”, was 238 (49.6%), followed by the knowledgeable level, which is “some knowledge”, was 111 (23.1). These percentages suggest that more than half of the respondents have a good knowledge related to cloud computing. The highest number of participants belongs to the years’ of experience (2-5 years), including 250 respondents (52.1%), followed by the years’ of experience (6-10 years), including 111 respondents (23.1%). These results indicate that most of the respondents have considerable experience related to cloud computing.

Phase 1 of this research come out with 11 main important benefits that identified by the participants based on their knowledge and experience as IT managers. Some of these findings already have been highlighted in the literature, and some of these findings are new. A question (on a seven-point scale) was included to evaluate the use of each of these benefits.

**Findings and discussion.** The results of phase 2 confirm that the adoption of cloud computing is perceived to provide better services to the organizations where 65 percent of the research participants identifying “strongly agree”. The research also confirmed that the adoption of cloud computing is perceived to reduce IT infrastructure with 74 percent selecting “strongly agree”. Seventy percent of the research participants selected “strongly agree” with statement that cloud computing reduced the level of risk. Sixty five percent selected “strongly agree” with statement that the adoption of cloud computing provided disaster recovery and backup and storage capacity to the organizations.

**Provide better services.** This research confirmed the literature findings that providing better services to the
stakeholders of organizations was the most significant benefit shared by the majority of the research participants. Figure 2 illustrates that nearly 65 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing provided better services to the organizations. The benefit of better services entails many different positive effects that cloud computing technology may bring. Some examples are reduced risks for the organizations, having access over the data anytime and anywhere, and better management of services.

The interest in cloud computing derives from the anticipated benefits (LGAQ 2013), it offers low starting expenses (Saeed et al. 2011; Saini et al. 2011; Jain & Bhardwaj 2010; Miller 2008). This financial benefit is expected mainly because of the usage-based pricing model. Start-up organizations in particular can use to help them to decrease their capital expenses and any hurdles to entry (Grossman & Gu 2009). Cloud computing provides almost direct access to shared computing resources and small and start-up businesses can launch new operations quickly with little to no upfront capital investment; this will assist with a faster time to market in many businesses (Lanman et al. 2011; Marston et al. 2011). Using software from the cloud will lead to a reasonable reduction in systems maintenance and updating requirements (West 2011).

Reduce IT infrastructure. This research confirms that the reduced of IT infrastructures by the organizations is one of the significant benefit of the adoption of cloud computing. This particular benefit is greatly connected to the reduced costs as discussed in the previous point. Figure 4 shows that 74 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing resulted in reduced utilization of IT infrastructure.

Cost reduction. The other benefit of cloud computing confirmed by this research was the expected cost reduction of the organizations especially once the cloud model has been perfected and maximized. Figure 3 demonstrates that about 58 percent of the research participants selected “agree” with the statement that the adoption of cloud computing reduced the cost. Participants indicated that cost reductions on operations by using cloud computing is anticipated. They believe that cloud computing bring a reduced use of physical hardware system which save a large portion of the financial resources for the organizations. Overall, participants indicated on how organizations will benefit by saving costs and managing their finances, which ensures productivity and sustainability in the long run.

There are several benefits in cloud computing and one of the prime benefits of this advanced technology, particularly with regard to government organizations services in which cloud computing plays a significant role in minimizing the IT infrastructure (Das et al. 2011). In other word, there is no other IT financing is needed in case of infrastructure, programming and support resources advancement (Beaubouef 2011; Sperling 2010).

Remote access. This research found that remote access is new important benefits that emerged upon the adoption of cloud computing. Figure 5 illustrates that 52 percent of the research participants selected “strongly agree” with the statement that remote access is one of the significant anticipated benefits of the adoption of cloud computing. Thirty four percent of the research participants selected “agree” with that. The participants indicated that by utilizing cloud computing, organizations then have access to the remote and rural areas which can in turn into greater advantages especially having a larger audience reach. The participants notice 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. So, 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.

Disaster recovery and backup. This research confirms that disaster recovery and backup is emerged as an important anticipated benefits of the adoption of cloud computing. As shown in Figure 6, this research found that around 64 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing provided disaster recovery and backup to the organizations data. Twenty two percent of the research participants selected “agree” with that. Based on participants’ 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.

Disaster recovery provisions are essential for the endurance and long-term existence of many organizations to make sure whether they hold the capability to survive at the proceedings caused by their IT infrastructure. Disaster recuperations schemes in cloud systems provide more choices when compared to traditional disaster recuperation programme in order to restore the data in a prompt and swift manner (Rajkumar et al. 2011). With regard to this recovery type, the overall cost can be reduced and consumes less time (Staten 2011). Government can maintain a backup of the server through employing cloud system as an efficient backup for the disaster recovery on a day-to-day basis and can store it off-site through implementing a third party storage service provider that holds the ability to store in a different location (Hashemi et al. 2013).

Flexibility. This research confirm that the concept of flexibility was emerged as an important benefits for the adoption of cloud computing. Figure 7 illustrates that 56 percent of the research participants selected “agree” with the statement that the adoption of cloud computing provided flexibility of the organizations systems. Twenty five percent of the research participants selected “strongly agree” with that. Flexibility was touched in the first major benefit founded by the researcher where in the stakeholders are given the opportunity to access their data anytime and anywhere.

Perceived complexity of the technology seriously hinders the increase in adoption rates and user satisfaction. Cloud computing, the operating interfaces of cloud applications look like browser web based applications or windows based applications. Both interfaces tend to be intuitive and easy to use (Melvin & Greer 2009). Most cloud computing suppliers offer more flexible contract terms, which encourages organizations to implement cloud services as needed to expand their businesses (Leavitt 2009). In addition to these significant characteristics of cloud computing, there is the portability and accessibility feature, as the Internet is considered the backbone of the utilization idea, through which computing services are provided for clients through an active Internet connection. On-demand access to any application can be at any time from any location, provided the client has network access (Lanman et al. 2011). This can assist small businesses, which have a wide market and broad horizontal company operations, such as regional or international, to decrease external costs and make them less location dependent.

Availability of services. Another connected benefit to flexibility is the availability of services. So, this research confirmed that the concept of availability of services within the organization was emerged as an important benefits for the adoption of cloud computing. Figure 8 shows that 52 percent of the research participants selected “agree” with the statement that the adoption of cloud computing provided availability of services within organizations. Thirty two percent of the research participants selected “strongly agree” with that.
Availability refers to the uptime of a system, a network of systems, hardware and software that collectively provide a service during its usage (Ahuja & Mani 2012). Could computing is a third party service and consumers heavily rely on the service providers for their computing needs. These computing needs range from research to businesses to high performance computing (Ahuja & Mani 2012). Technically there are several levels within cloud computing where high availability of services can be achieved. These levels include application level, data centre level, infrastructure level and geographic location level (Rackspace 2010).

**Reduce staff.** This research strongly confirm additional benefit of cloud computing would be staff reduction. Figure 9 demonstrates that 37 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing reduced IT staff within the organizations. Twenty six percent of the participants selected “agree” with that, and other 18 percent of the participants selected “slightly agree”. But, 12 percent of the participants selected not sure if the adoption of cloud computing reduced IT staff within the organizations. The employment of reduced staff which may bring other advantages such as an organized management, cost reductions, and more. The adoption of cloud computing indicates that a reduced use of specialized people to maintain the organization is needed since cloud computing will then do much of the work upon adoption and transfer of data and information.

![Figure 9. Reduce staff](image)

According to study by West (2011) one of the most important benefits of 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. On the other hand, some studies found that cloud computing does not remove the necessity for IT branch staff, on the grounds that clients still oblige access to the Internet and application configuration. Cloud computing permits IT administrator to focus on core business functions. As with any ICT operation, potential cloud computing adopters must be vigilant in testing theirIT foundation and operations (Castellina 2011; Lenart 2011).

**Time efficiencies.** This research found that saving time or time efficiencies is new important benefit that emerged upon the adoption of cloud computing. Figure 10 shows that 40 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing saved time of the operational process within the organizations. Forty one percent of the participants selected “agree” with that, and other 12 percent of the participants selected “slightly agree” with that. Within the adoption of cloud computing all the organization data is then stored in one or organized sets of location therefore time market will be a lot quicker and more effective.

![Figure 10. Time efficiencies](image)

**Reduce the level of risk.** This research found that reduce the level of risk is new important benefit that emerged upon the adoption of cloud computing. Figure 11 illustrates that 70 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing reduced the level of the 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.

![Figure 11. Reduce level of risk](image)

**Storage capacity.** This research confirm that the concept of storage capacity was emerged as an important benefits for the adoption of cloud computing. As shown in Figure 12, this research found that around 64 percent of the research participants selected “strongly agree” with the statement that the adoption of cloud computing provided storage capacity to the organizations. Due the increase of the amount of the data, storage capacity become a problem of most of the organizations.

![Figure 12. Storage capacity](image)
Capacity includes increased computing power, improved performance, unlimited storage capacity, increased data safety, and fewer maintenance issues (Miller 2008). Many organizations fully utilize less than half of their total ICT resource capacity (Leavitt 2009), and most computing suppliers try to focus on the idea of offering computing services to their clients where they can scale up their capacity on demand (Grossman & Gu 2009). Whenever the client needs additional computing resources such as storage space, the provider can simply increase the provision accordingly in order to handle the increased business needs.

**CONTRIBUTIONS**

This research contributes to the ICT technology adoption literature, by investigating the anticipated benefit from the adoption of cloud computing in regional councils. Looking at regional council’s adoption of new IS innovations can help enrich knowledge and understanding of the innovation adoption process in this era of rapid development of new technologies. This research leads to important practical implications for technology consultants. Regional councils represent organizations that provide services to the local citizen and the businesses in most economies, and consequently represent an important market segment for cloud service providers. Cloud service providers may need to improve their interaction with regional councils who are involved in the cloud computing, in an effort to create a healthy environment for cloud computing adoption, and to remove any vagueness surrounding this technology. The findings of this research may help IT managers and top management evaluate possible adoption by increasing their understanding about anticipated benefit which will encourage them when planning or decided to adopt cloud computing. Taking all the above into account, this research presents some useful information for organizations, technology consultants. This research is viewed as being relevant to the current era of rapid developments of cloud computing technologies.

**LIMITATIONS AND FUTURE RESEARCH**

There has not been much research done on cloud computing in reference to Australia. Future research could build on this research by investigating the anticipated benefit of cloud computing adoption in different sectors of the economy and industries. On a geographical dimension, this research was primarily limited to the regional councils in Queensland.

**CONCLUSION**

Cloud computing is a latest technological paradigm in IT world, related to the delivery of computing as a service. It has been proven that the application of cloud computing carries important benefits such as scalability and cost reduction. It also holds the advantages of maintenance, installation cost saving, and pay-as-you-go framework. Cloud computing as an exciting development is a significant alternative today’s local government sector. Employees and external users have the opportunity to quickly and economically access various application platforms and resources through the web pages on-demand. This automatically reduces the cost of organizational expenses and offers more powerful functional capabilities.

This research focuses on the anticipated benefits of cloud computing adoption in Australian regional municipal government environment. Since there is limited literature related to Australian regional municipal governments and cloud computing. The empirical research was done at Queensland local councils by employed in-depth interviews with the IT managers to investigate the anticipated benefits that related to cloud computing adoption. Also, survey data from 480 IT staff across 47 local councils were collected to confirm the findings of the exploratory stage.

The findings derived from this research have shown that cloud computing adoption in government organizations resulted in significant cost reductions, improved service delivery and reduced IT infrastructure. Furthermore, time-effective and convenient services were delivered to the public. From the points of benefits provided by cloud computing, there is a great result for local councils IT staff to take them away the responsibility of the maintenance burden in the councils. Adopting cloud network redundancy eliminates disaster recovery risks and its high costs. There can always be new tools and applications to improve IT features. These results validate the normative literature. In addition to this, since the core of Australian local government council’s initiatives includes information exchange, processing and service delivery, cloud computing seems to be an effective means of the next generation systems integration.

**ACKNOWLEDGMENTS**

This research was funded through an Australian Postgraduate awarded at the University of Southern Queensland. The research was approved by the USQ Ethics Committee and was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

**REFERENCE**


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