Success in the Digital Economy: Cloud Computing, SMEs and the impact to National Productivity

Research in Progress

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Abstract

The literature is scant around the take up rates of cloud computing by Small and Medium Enterprises (SMEs). This is important because Small and Medium Enterprises (SMEs) play a significant role in increasing national productivity. In Australia, SMEs employed around 70% of the total numbers of employees in 2011. This paper proposes a research program to examine how cloud computing can provide SMEs with the potential to achieve competitive advantage, increase efficiency and lift national productivity. The research will use both quantitative and qualitative measures to establish the take up rate of cloud computing and identify the critical success factors (CSF) for SMEs when adopting cloud computing technologies.

Keywords

Cloud computing, Australian Small and Medium Sized Enterprises, Digital Economy, SMEs and cloud computing, Australian SMEs, Critical Success Factors.

INTRODUCTION

The trend of cloud computing will provide distinct benefits to business environments to improve digital productivity and simplify electronic business. Cloud computing potentially provides significant opportunities for businesses of all sizes to gain discernible benefits, such as increased flexibility, online operating service availability, maintainability, affordability, and scalability (Garrison et al. 2012; Marston et al. 2010). In more detail, cloud computing opens the doors for Australian Small and Medium sized Enterprises (SMEs) to improve their outcomes that empower the national economy (MYOB 2012). There have been several industry studies exploring the take-up rate of cloud computing. However, there are no academic studies on the rate of adopting and using cloud services by Australian SMEs, nor studies exploring the critical success factors in adopting cloud computing for Australian businesses. This paper will give a brief discussion about some of the current research areas in cloud computing, and the possible challenges in adopting cloud computing. What will follow will be the significance of Australian SMEs. The proposed research will then be discussed in more detail.

CLOUD COMPUTING ADVANTAGES

Cloud computing services can bring several advantages to business organisations. It can provide the ability to empower innovation trends in organisations from the IT side, by providing several solutions with the distinct reduction of IT obstacles (Marston et al. 2010). Also, cloud computing provides direct access to hardware infrastructure remotely via the internet and treating IT as an operational expense, rather than having the need to invest in IT resources, with each client being separated from others virtually on the same physical resources, by balancing the loads of client consumption among resources (Marston et al. 2010). The scalability of IT resources is another feature of cloud computing, where the enterprises are able to scale resources up and down depending on their requirements (Dubey and Wagle 2007), which is one of the main features of cloud computing, such as Pay-as-you-go that allows users to pay only for resources used (Leavitt 2009). In addition, utilising cloud computing could help in reducing IT investment and operational costs. For investments, companies can rent the required IT resources from the cloud provider instead of building dedicated IT centres. On the other hand, organisations can cut operational costs of servers, licenses, energy, staff, and other IT resources by authorising a third party which is the cloud provider, to perform such tasks (Choo 2010; Marston et al. 2010). This financial saving can help small and medium organisations (SMEs) to manage their limited budgets by saving IT service costs and scale up their capital to empower their business (Miller 2008). Cloud computing also opens the door for developing countries that lag behind in utilising the latest information technology resources (Marston et al. 2010). Such benefits are not however without issues.

CURRENT CHALLENGES FACING CLOUD COMPUTING ADOPTION

As with any technology, there are several threats which could affect the evolution of cloud computing. Challenges to adopting cloud computing could be categorised into four main groups, which are: *technical*, *organisational and policy*, *legal*, and *miscellaneous* risks (Khajeh-Hosseini et al. 2012).

Lack of Data Control could be considered a major legal and organisational threat to adopting cloud services for the business. The sense of controlling data by others leads companies to think they lack flexibility compared with an on-premises option to edit or change their applications (Leavitt 2009; Miller 2008).

Multitenancy and Cyber-attacks are one of the major technical issues in cloud computing. While data from different clients are stored in a single multi-tenant server, the server needs to run at the maximum protection level to ensure security. Furthermore, if one of the virtual environments faces attack, the server must provide complete protection to the other virtual tenants (Choo 2010).

Data Availability is also one of the main technical and organisational issues in cloud computing. Organisations must have the highest online availability, as such they may not accept faults that could hinder their work (Choo 2010).

Data Privacy and Security is another data-related dilemma that hinders the expansion of cloud computing. Clients wonder if cloud service providers can provide better or even the same level of data privacy and data security, compared with an in-house model (Zhang et al. 2010).

Lack of cloud standards is yet another technical risk that inhibits cloud growth. There are no clear interfaces between platforms from different service providers (Armbrust et al. 2010). Consequently, cloud clients may face several problems when they decide to move to another cloud provider. However, some of the main industry cloud players such as Microsoft and Google have commenced dealing with this issue through developing different solutions to move data to and from their systems (Marston et al. 2010).

Cloud computing regulation is also a critical political and legal issue from a business perspective, but is required in order to regulate dealing with cloud computing on local, national and international levels to ensure availability, accessibility, and privacy under any possible conditions (e.g. natural, financial or political), to avoid unexpected consequences. Therefore cloud stakeholders are required to set clear Service Level Agreements (SLAs) highlighting all possible issues (Alliance 2011).

The successful utilisation from cloud computing which is considered the fifth most important utility after water, electricity, gas, and telephony (Buyya et al. 2009) could give enterprises the opportunity to concentrate on their main business processes rather than spending their resources in managing and operating IT centres that consume budget and time on other tasks in running IT centres. Garrison et al. (2012) suggested the challenges of cloud computing adoption could be classified under three main categories - technical, managerial, and relational. The literature above shows that most of the challenges could fit under one or more of these categories, as shown in figure 1 which provides an example of cloud risk classification into three categories, which will become the main perspectives in this study.

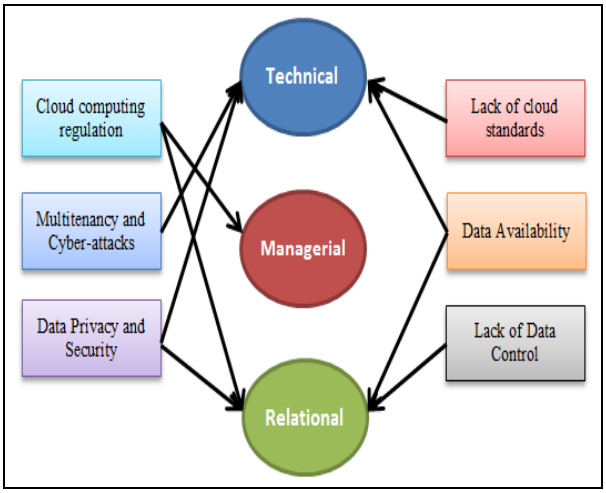

Figure 1: Cloud Challenges in 3 Categories

CURRENT IS RESEARCH AREAS IN CLOUD COMPUTING

In cloud computing, there are many areas need to be examined within a specific geographical region or country. For instance, at the Australian level Dr. Renato Iannella - principal scientist of National ICT Australia, suggested research to build Australian cloud services to put all local data under Australian control and protection, in order to mitigate the fear of migrating data overseas that could be affected by foreign rules and policies (Choo 2010). All Australian enterprises have to comply with the Australian Government's *Privacy Act1988 (Cth)* - an Australian law, that sets the rules with regard to the handling of individual information including the disclosure, storage, use and collection of personal information, and transborder regulations (Privacy_Act 1988).

From the *economic* Cloud Computing perspective several areas require further exploration, such as the need to show how cloud enablers can add economic value as well as what the most suitable pricing strategies are. For

example, different pricing strategies such as flat rate, payment per use or a combination of payment strategies (Marston et al. 2010) are commonly associated with cloud computing. Decisions on the most appropriate pricing strategy require an analysis of each method to ensure the relationship between quality and investment as well as to find the best practice in this field. There are also legal perspectives, such as *regulation* involving the Australian Government privacy act, or regulation relating to pricing, SLAs, security, international standards, risk assessments, adoption, and partnerships. With regard to the *adoption* of Cloud Computing, many issues need to be addressed. Implementing cloud computing requires an understanding of best practice and development of risk assessment methodologies, such as security in hardware and software and policy in general (ENISA 2009). Moreover, such research might include economic aspects to develop a model in order to gain the highest financial benefits with minimum implementation and operational costs. Issues relating to *strategy* could target clients to determine the most important factors in order to meet their business goals, whilst targeting IT organisations that attempt to provide cloud services; this also includes matching business goals, issues of change management, as well as staff training. Issues relating to *Policy* vary from managing the migration from on-premise to a third party in the cloud, setting a road map for migrating standards to cloud providers, and setting the rules for monitoring and auditing cloud services locally and internationally. All of these areas are ripe for further research, but what of the Australian context?

THE SIGNIFICANCE OF AUSTRALIAN SMES

The Reserve Bank of Australia (2012) considers SMEs to be the backbone of the national economy of Australia. SMEs are important because they employ over 70% of the workforce and contribute more that AU$480 billion to the national economy (Department of Innovation Industry, 2011). There exists an opportunity for SMEs to adopt cloud services to develop flexible IT platforms at a relatively low cost. Cloud services provide the IT resources for SMEs to take advantage of online services such as e-commerce, without a massive investment in IT resources (Galer 2013). The Reserve Bank reported the total number of Australian businesses in 2011 was approximately 2,045,000. These figures show that 96% of businesses in Australia are classified as small businesses, and of those 1,815,000 are classified as micro businesses (1-4 employees). Medium-sized organisations represent 4% of Australian businesses with 81,000 companies. Large business were only 0.3% with 6,000 enterprises (Connolly et al. 2012).

The Australian Department of Innovation Industry reported there were around 4.8 million people working in small businesses by the end of June 2010 (Australian 2011). The Reserve Bank of Australia (2012) reported around 47% of employees were working in small businesses (including micro businesses), with 23% in medium organisations, and some 30% in large enterprises (Connolly et al. 2012). This shows that approximately 70% of employees are working in the SME sector, which plays a significant role in the Australian economy, and in turn provides an impetus for taking advantage of cloud computing to remain internationally competitive as well as improving national productivity.

As a final note, in March of 2014, the City of Sydney Council highlighted the significant importance of small sized organisations in Sydney by considering this sector as the core of Sydney's economy. The council reported that more than 80% of all businesses in the city were small businesses, which have more than 100,000 employees and contributed around 25% of Sydney's economic output, by more than AU$25 billion annually. The report also stated the strong relationship between small businesses and other sectors of medium and large enterprises by supporting their operations efficiently (City_of_Sydney_council 2014).

THE GAP IN THE CURRENT SITUATION

There has been a significant growth in the cloud computing market over the last few years. The Gartner Group (2013) reported that the global cloud services' market was valued at $110.3 billion in 2012, and is predicted to grow 18.6% to $131 billion in 2013. The Infrastructure as a Service (IaaS)[1] market was $6.1 billion in 2012 and this number was forecast to be $9 billion in 2013. The Gartner report also mentioned the major sectors of cloud computing market. Advertising in the cloud is classified as a top investment sector in the cloud by 48% of the total market in 2012. Moreover, the cloud investment is estimated to rise to $677 billion from 2013 to 2016, where around $310 billion is dedicated to advertising. The second largest industry in the cloud is the Business Process as a Service (BPaaS)[2] market by 28%. Software as a Service (SaaS)[3] comes in third at 14.7%, followed by IaaS by 5.5%, and cloud security and management at 2.8%, while the last sector was the Platform as a Service (PaaS)[4] at only one percent (Anderson et al. 2013). The importance of the cloud computing market could add

[1] i.e. proving computing hardware and associated platforms, as a service to customers: - usually used by administrators.
[2] Which as its name suggests provide business process expertise, including managing such processes to clients.
[3] Providing and hosting software applications as a service: - mostly used by end users.
[4] Providing hardware infrastructure, operating systems, and developing platforms: usually attracts developers.

value to the Australian economy through improving productivity via most business sectors, with business sizes from micro to large enterprises.

A survey undertaken in 2010 conducted in 636 companies in five countries (USA, UK, China, Japan, and Australia) showed that 88% of IT decision-makers agreed that cloud computing would be a priority in their organisations. Cloud computing was identified as important for achieving eight key objectives, which are e-industry regulatory change, disaster recovery, improving capability and availability, minimizing IT investment in infrastructure, enhancing IT control, business agility, mitigating IT maintenance and management as well as improving IT productivity. Business agility was identified by 75% of interviewees as the most important contribution of cloud computing. The second most important contribution at 56% was reducing IT infrastructure investment. The third most important at 53% was decreasing IT maintenance and management resources. Other cloud contributions included improving capability and availability (50%), improving IT productivity (46%), disaster recovery (40%), enhancing IT control (32%) and finally industry regulation (17%) (CIO and IDG 2011).

It is difficult to ascertain the adoption rate of cloud computing services for SMEs in Australia, however industry reports suggest that the take up rate is around 1 in 5 or 20% (MYOB 2012). The Organisation for Economic Co-operation and Development (OECD) supports the uptake of cloud computing by SMEs because of the importance of cloud computing in becoming the fifth important utility (after water, electricity, gas, and telephony) (Buyya et al. 2009). Compared to other OECD countries, the adoption of cloud computing by Australian SMEs appears to be significantly lower. For example, Flood (2013) predicts that 75% of American businesses and 61% of British businesses utilise cloud services. Another example, South Africa (not a member of the OECD), has 52% of SMEs (including micro businesses) consuming cloud services (Hinde and Belle 2012). Moreover a recent study on 484 American organisations[5] with 260 responses, showed that 81% of the studied organisations were utilising cloud services. The same study presented the responses of 483 senior IT leaders who revealed that cloud computing is the third most significant IT investment in U.S. organisations after business intelligence and customer relationship management (CRM) systems. The study further stated the massive increase in the priority of cloud computing investment in the U.S. which was 17th ranked in 2009 and became the 3rd ranked in 2013 (Kappelman 2013). Let us now examine some of our research techniques more specifically.

RESEARCH PURPOSE

There are three broad philosophies for conducting academic research. The first category is *exploratory*, which is used to explore new ideas from nothing or from a limited amount of knowledge. It leads to generation of new "what questions" in the future to address a specific issue. The second is *descriptive*, which is used to describe a well-known issue in more detail, creating new types or categories, and answering the "who" and "how" questions. While e*xplanatory* research studies the reasons for the occurrence of a well-known situation, by answering the "why" questions to connect cases with general principles (Neuman 2010).

The limited information about the take-up rate of cloud computing as well as the critical success factors for SMEs in the Australian context places this research within the exploratory camp to answer questions such as: *what is the take-up rate of cloud services for Australian SMEs?*, *what are the critical success factors for this kind of utilization?* and *what are the possible challenges in the take up of cloud computing?*

As a part of this study, certain companies have utilised some cloud computing services and may have faced challenges. Therefore, we can also focus the research light on those difficulties and answer the question of *how companies dealt with cloud utilizing hindrances?*, which may be classified as descriptive research.

RESEARCH THEORIES

This research is based on two further theories. The first theory used is *deductive*, which starts with a well-known theory followed by hypotheses (Bryman 2012) used to plan the roadmap of research. This study explores the critical success factors of cloud computing utilized by Australian SMEs as well as the challenges that organisations may encounter.

Secondly, *resource based theory* (RBT) focuses on the awareness of available resources and their capabilities to achieve competitive advantage reaching strategic goals (Grant 1991; Taher 2012). Thus RBT is used to explore the availability of resources of SMEs to achieve competitive advantage in the Australian business context such as human resources, physical assets as well as external resources such as cloud service providers.

The main hypothesis of this research is adopted from RBT (Grant 1991). It is assumed that the positive utilisation from available organisational resources (technical, managerial, relational) will improve capabilities

[5] 34th Annual Society for Information Management's (SIM) IT Trends

through adopting cloud computing for Australian SMEs, which in turn provides the organisation with competitive advantage.

RESEARCH APPROACH

The discussion above shows the major issues are summarized in three main points: 1 - there are no clear academic studies showing the take up rate of cloud services for Australian SMEs.; 2 - there is a need to study the CSFs in cloud computing adoption by such SMEs; 3 - a requirement exists to better understand the challenges of cloud computing adoption. Enhancing our understanding in these areas will potentially provide insights into how SMEs can use cloud computing to increase competitive advantage and in turn improve national productivity.

Due to the IS nature of this research it would also be prudent to also discuss appropriate research epistemologies. In general, there are several social research methods, however there are three main epistemologies, being those of *positivist, interpretive,* and the *critical social research method* (Myers and Avison 2002). In this research the initial epistemology will be interpretive, which starts with assumptions that might lead to reality. It is typically used to understand a phenomena such as the influences of information systems on the organisation (Walsham 1993). Such an epistemology has been selected for several reasons. First, the nature of this research is to understand the cloud computing phenomena, by obtaining insights into successful cloud utilisation by Australian SMEs, which reflects the interpretive method. It is important to establish the existing level of adoption of cloud computing because there has not been any rigorous academic research to establish this. In addition, what is required is to establish the status of cloud computing adoption in organisations, something that has been initially addressed by the authors in the complementary ACIS paper to this one (Busch et al. 2014). After collecting data, the reality then begins to form. At this point a positivist epistemology will prove beneficial in order to analyse the collected data.

What we propose is to investigate the CSFs in Australian SME adoption of cloud computing as illustrated in figure 2. This research indirectly aims to provide a benchmark on the status of SME adoption of cloud computing in the Australian context over the years 2014-2106. Moreover the proposed research will follow an applied research orientation in order to define a roadmap and identify needs of successful adoption of cloud computing for Australian SMEs going forward. This research will target selected practitioners in Australian organisations, such as SME managers and owners, IT staff, and key decision makers.

The research will consist of two macro-phases. The first phase will explore the take-up rate and CSFs from technical, managerial and relational perspectives (Garrison et al. 2012) as illustrated in figure 3. The *technical* perspective includes the IT resources required to provide the organisation with the functionality, flexibility and scalability required. The *managerial* perspective includes the human resources (including IT human resources) required for successful cloud computing adoption. The *relational* perspective includes the relationship with cloud service providers (Garrison et al. 2012), which by definition exist external to the organisation being researched. A quantitative survey will be used in the form of written questionnaires that will target a significant number of Australian SMEs. The findings from this first questionnaire phase will inform the second phase. For example, Isom and Holley (2012) note the importance in building a cloud adoption strategy. This strategy contains a check list of ten important steps in cloud adoption that should be identified, which are cloud vision, use case, drive business innovation, expected outcomes, cloud ecosystems, stakeholders, metrics, governance, and roadmaps (Isom and Holley 2012). These factors will be included in the survey under one of the three main perspectives mentioned above. The survey has already been coded in electronic form using *qualtrics.com*.

A pilot survey was conducted via a paper-based questionnaire with 20 IT professionals. The main purpose of this pilot study was to refine the research questions as well as survey's questions before conducting the main online survey.

In phase 2, an exploration of the business case and key challenges and limitations of cloud computing will be undertaken, using case studies and semi-structured interviews. From phase 1, participants who agreed to participate in the second phase will be contacted for interviews.

Depending on the number and variety of the contributors' industries, the targeted interviewees will be selected from different industries, such as IT, finance, and education. The interviews will likely be classified according to business location, such as metropolitan or country areas. It is then proposed to conduct around five detailed case studies.

Each case will be studied through a different 'lens', which are *technical, managerial, rational,* as well as the *general production* view. For example the technical perspective may likely inform the best practice of implementing cloud technologies, the challenges faced and how to overcome them: such as issues of compatibility, security, and training. The managerial view will likely investigate the managerial challenges, such as business process reengineering (BPR). The relational view would focus on human behavioural issues of

utilising cloud computing: such as confidence, trust, and change management. Finally, the study will investigate general issues: such as business outcomes and job security.

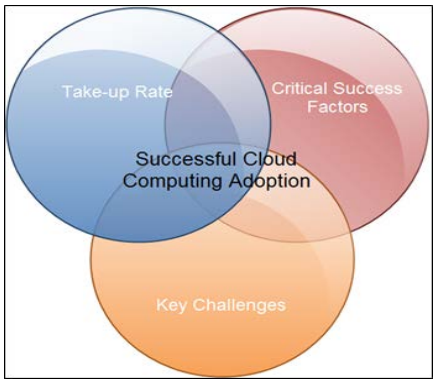

Figure 2: Research conceptual framework

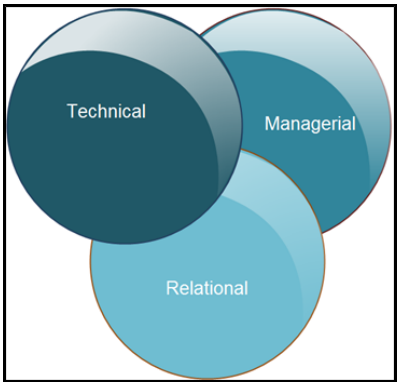

Figure 3: The Examined Perspectives

The following figure (4) illustrates the detailed framework of this research. It shows that considering the success of cloud computing utilisation for Australian SMEs should go through different steps. The current take-up rate of cloud computing should be the first step in this research to explore the current cloud computing utilisation for Australian SMEs.

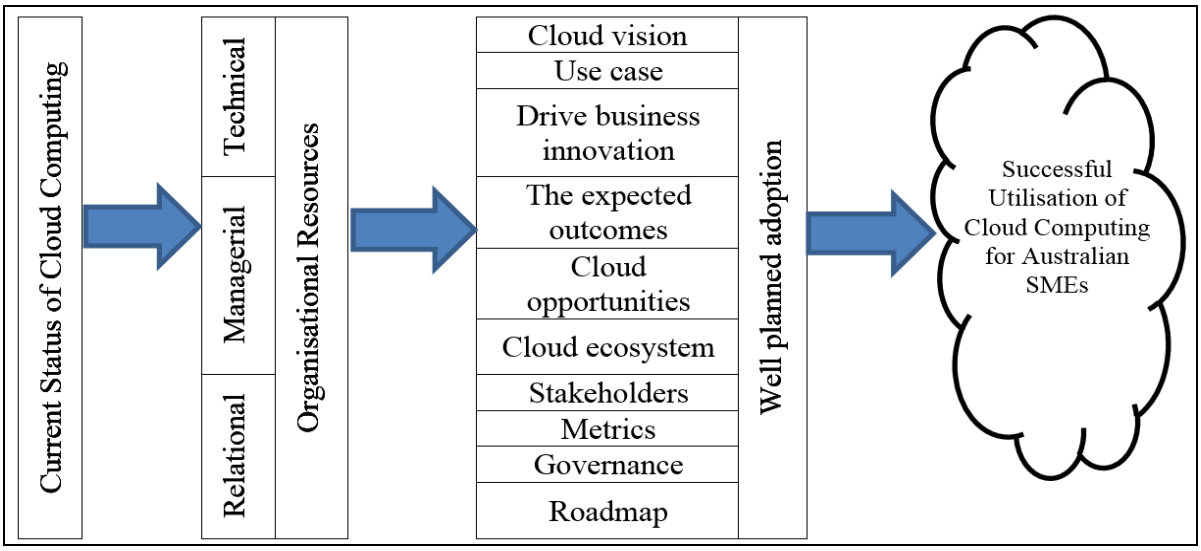

Figure 4: Detailed Research Framework

Then, the availability of the organisational resources is considered as an important success factor of adopting cloud computing (Grant 1991). These resources can be classified as technical, managerial, and relational (Garrison et al. 2012). The availability of these resources require a well plan of cloud adoption. This plan consists of ten important factors to be covered (Isom and Holley 2012), in order to overcome the possible challenges and to end up by the desired cloud utilisation. Information gathered from this stage will provide the rich data required to obtain insights into how (or not) Australian SMEs adopt cloud computing technologies to achieve competitive advantage and in turn strengthen the national economy. The research will target Australian SMEs in all sectors nationally, as there is no clear academic study for Australian SMEs as mentioned above

RESEARCH VARIABLES AND EXPECTED OUTCOMES

The dependent variable of this research is achieving competitive advantage among competitors. The independent variables are the resources which are technical, managerial and relational. This research will examine several variables via two phases. Again, the first stage (the online questionnaire) will examine the take-up rate and relevant CSFs of cloud computing. The second stage will investigate the difficulties (if existing) of utilising cloud computing and the best practice of dealing with them. The following table shows the variables and the purpose of each variable. Note, in the table the selected groups of staff numbers are based on the following:

- The first group (0-4) represents micro organisations in the Australian context.
- The second group (5-19) represents small organisations.
- The groups (20-50, 51-100, 101-150, and 151-199) show medium organisations. They have been divided into four groups to study the trend more specifically in this large subset.
- The last group (200+) represents the large organisations, which are out of the scope of this study.

Table 1: Research Variables

Category	Variable	Purpose
Organisational General Information	Number of branches	To examine the trend of cloud computing utilisation if the organisation has one office or more.
	Location	To compare the effect of metropolitan vs. rural areas to using cloud services.
	Number of staff	To see the trend of different groups of Australian SMEs depending on the number of employees (0-4, 5-19, 20-50, 51-100, 101-150, 151-199, 200+).
Technical Background	Availability of data centres	To see the effect of existing data centres on the decisions of utilising cloud computing.
	The use of the enterprise cloud services	To show the range of Australian SMEs utilising cloud enterprise services, which will lead to different questions in terms of acceptability, trust, cost, complexibility, availability and other drivers.
	The use of enterprise versions of consumer services	This will show the acceptability of utilising cloud services, even if only off-the-shelf services, such as Outlook or Gmail. This will lead to understanding the level of cloud computing in further details.
	The key factors in utilising the cloud	To investigate the drivers of cloud computing for Australian SMEs.
	The hindrances to adopting cloud services	To investigate the obstruction of utilising cloud computing for Australian SMEs.
Resources and Capabilities (Technical, Managerial,	The availability of technical support and knowledge	To examine the effect of technical resources in adopting cloud computing.
	Managerial support	To investigate managerial perspectives in utilising cloud computing through providing the required support.
	The factors of successful adoption of cloud computing	To examine the validity of ten managerial factors in adopting and utilising cloud computing.
	The relational perspective	To examine the relationship effects between organisations and cloud service providers. This part includes a study of the trust level before, during and after adopting cloud services.

SURVEY COMPONENTS

The survey covers two important factors in this study, which are the take-up rate and the critical success factors of utilising cloud computing from technical, managerial and relational perspectives, as mentioned above. To achieve these outcomes, the survey has been divided into three main components as in figure 4. The *first* component is designed to confirm that the participated organisation meets the examined criteria. For example, this part will validate that the participant is an Australian organisation and consist of one to 199 employees to be considered as Australian SME. The *second* part will investigate the first main component of this study; which is the take-up rate of cloud computing in Australian SMEs. This part contains several questions to ensure that the participant has sufficient knowledge to consider the organisation as a cloud service user or not. The *third* part of this survey will examine the critical success factors of utilising cloud services (technical, managerial and relational factors). In addition, Isom and Holley (2012) state the importance of building a cloud utilizing strategy. This strategy contains a check list of ten important steps in utilizing cloud that should be identified, which are cloud vision, use case, drive business innovation, the expected outcomes, cloud ecosystem, stakeholders, metrics, governance, and roadmap (Isom and Holley 2012). Each of these steps is classified as technical, managerial or relational factors.

SURVEY FIRST RUN

The survey in this research will explore two important factors of this study, which are the take-up rate of cloud computing for Australian SMEs and the CSFs of cloud utilisation. In order to achieve the desired design, a pilot survey had been conducted via a paper-based questionnaire with 20 IT professionals. The main purpose of this survey was to refine the research questions as well as survey's questions before conducting the online survey.

After refining the survey questions in the pilot survey stage, this survey has been sent to more than 700 organisations as a pre-test. The purpose of this stage is to ensure that the survey was visible and executable. The very limited response rate (1%) led to an investigation as to why the response rate was so trivial?

The questionnaire length plays a very important role in the response rate. A marketing study (Deutskens et al. 2004) run to investigate the response rate to online surveys, showed that response rates to a short survey was 24.5% compared to 17% for a long questionnaire. Also, it is most likely for respondents to abandon long surveys before completing them (Deutskens et al. 2004). In our case we found as few as 10 participants completed only a few questions and then abandoned the survey.

The relationship the participants plays is an important role in improving the response rate. An industry study stated the clear difference of the response rate if the invitation has been sent to specific groups vs. general clients.

Figure 4: Survey High Level Components

It showed that the response rate to a short survey that consists of up to 12 question from specific groups varied from 40% to 60%, while the rate dropped dramatically to less than 10% if the invitation targeted general customers to participate in a medium length survey, which consisted of 12 to 25 questions (PeoplePulse 2014).

There is another assumption around this issue of abandonment which relates to the targeting of emails. It is assumed that a response rate could be very low if the invitation was sent to a general email address without recourse to a list such as sales, marketing, IT staff, CEOs, CIO etc. However, the response rate could be improved if the invitation targeted desired groups, such as CIOs and IT staff.

DISCUSSION

The study results will provide useful insights for academics and professionals in cloud computing adoption by Australian SMEs. Currently, there are several difficulties in distributing and convincing people to participate in the online survey as well as in collaborating in the planned semi-structured interviews. It was assumed that participants might think the survey would be long. One of the reasons behind this assumption is because the invitation email was a trifle long and potentially couldn't convince recipients to participate. Another drawback in the old version was that there was no opt-out link to unsubscribe from the mailing list. This might lead some email servers to consider invitations as spams and thus avoid delivering them. Moreover this invitation started with a general audience with a "Dear Sir/Madam" appearing in the first sentence. This could be less attractive to participants than if the survey targeted a specific named individual.

NEXT STEPS

Currently we are investigating some specialised databases that can provide access to the contact information of specific groups. These groups include owners, Chief Information Officers (CIOs), Chief Executive Officers (CEOs), IT decision makers, IT department managers, and IT researchers. Also, the length of the questionnaire will be reviewed, and the invitations will be edited. In addition, the issue of starting emails by "Sir/Madam" will be solved via *qualtrics.com* that provide a feature of writing the exact name of recipients by reading them from the stored database.

CONCLUSION

Australian SMEs play an important role in the digital economy and national productivity, through the hiring of a significant number of employees in Australia. Utilizing cloud services has the potential to increase individual, organisational, and national productivity. The literature shows a clear gap in our knowledge on the take-up rate of cloud computing for SMEs in the Australian context and how cloud computing can be used for achieving competitive advantage. This research consists of two phases. In first phase, the study will attempt to address this issue by exploring take up rates and the critical success factors in adopting cloud computing amongst Australian SMEs. These factors will be categorized under three groups, which are technical, managerial and rational. The technical aspect will investigate data migration, and online availability; the managerial aspect will focus on the CSFs within the organisation such as business processes reengineering and teleworking; while the relational aspect will assess human relationships between cloud service clients and the service provider such as data protection and the trust between them. This phase will be based on a structured survey that will be distributed among Australian SMEs, and the results will help to establish the second part of this research. The questionnaire must be designed properly to increase the likelihood of participants' responses to the survey. All participants in

the survey will be invited to an interview in the second phase of this project, and around five of them will be selected for a detailed interview which will focus on the challenges of adoption that will be examined in the Australian context as the second part of this research project.

The research will provide insights to both researchers and practitioners by establishing the take-up rate of cloud computing adoption in SMEs in the Australian context. The research will determine the critical factors that lead to the successful deployment of cloud based services, and focus light on the challenges facing the Australian business environment. Again, some industry-based studies show the limited utilisation of cloud services for the Australian SME sector, while the literature highlights the absence of clear academic studies on the take-up rate of cloud computing for this important sector. This gap will be examined in the proposed research framework, and consists of three aspects, which are studying the take-up rate; estimating the approximate rate of Australian SMEs utilisation of cloud computing - the critical success factors and the challenges in order to facilitate the cloud services adoption as well as increasing the take-up rate, that would lead to improvements in the digital economy.

REFERENCES

Alliance, C.S. 2011. "Security Guidance for Critical Areas of Focus in Cloud Computing Cloud Security Alliance V.3," Cloud Security Alliance.

Anderson, E., Lam, L.-l., Eschinger, C., Cournoyer, S., Correia, J.M., Wurster, L.F., Contu, R., Biscotti, F., Liu, V.K., Eid, T., Pang, C., Swinehart, H.H., Yeates, M., Petri, G., and Bell, W. 2013. "Forecast Overview: Public Cloud Services, Worldwide, 2011-2016, 4q12 Update," p. 31.

Armbrust, M., Fox, A., Griffith, R., Joseph, A.D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., and Zaharia, M. 2010. "A View of Cloud Computing," in: *Communication of ACM*. ACM.org, pp. 50-58.

Australian. 2011. "Key Statistics Australian Small Business," S.a.R. Department of Innovation Industry (ed.). Canberra, Australia: Commonwealth of Australia.

Bryman, A. 2012. *Social Research Methods*. Oxford university press.

Busch, P., Smith, S., Gill, A., Harris, P., Fakieh, B., and Blount, Y. 2014. "A Study of Government Cloud Adoption: The Australian Context," in: *Australasian Conference on Information Systems (ACIS 2014)*. Auckland, New Zealand: p. 10 (Accepted).

Buyya, R., Yeo, C.S., Venugopal, S., Broberg, J., and Brandic, I. 2009. "Cloud Computing and Emerging It Platforms: Vision, Hype, and Reality for Delivering Computing as the 5th Utility," *Future Generation Computer Systems* (25:6), pp 599–616.

Choo, K.-K.R. 2010. "Cloud Computing: Challenges and Future Directions," in: *Trends & issues in crime and criminal justice*. Australian Institute of Criminology, Canberra, Australia: Australia's national research and knowledge centre on crime and justice.

CIO, and IDG. 2011. "Cio Global Cloud Computing Adoption Survey Results," C.C.S.G. (CSG) (ed.). vmware.

City_of_Sydney_council. 2014. "Supporting Small Business," Economic Strategy Unit and City Business & Safety Unit ~The City of Sydney Council, cityofsydney.nsw.gov.au.

Connolly, E., Norman, D., and West, T. 2012. "Small Business: An Economic Overview," in: *Small Business Finance Roundtable*. Reserve Bank of Australia 2012, pp. 1-14.

Deutskens, E., De Ruyter, K., Wetzels, M., and Oosterveld, P. 2004. "Response Rate and Response Quality of Internet-Based Surveys: An Experimental Study," *Marketing letters* (15:1), pp 21-36.

Dubey, A., and Wagle, D. 2007. "Delivering Software as a Service," in: *The McKinsey Quarterly*. pp. 1-12.

ENISA. 2009. "Cloud Computing: Benefits, Risks and Recommendations for Information Security," The European Network and Information Security Agency.

Galer, S. 2013. "The Secrets of Successful Smes," in: *Business Innovation from SAP*. SAP.

Garrison, G., Kim, S., and Wakefield, R.L. 2012. "Success Factors for Deploying Cloud Computing," *Communications of the ACM* (55:9), pp 62-68.

Grant, R.M. 1991. *The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation*. California Management Review, University of California.

Hinde, C., and Belle, J.-P.V. 2012. "Cloud Computing in South African Smmes

Risks and Rewards for Playing at Altitude," *International Journal of Computer Science and Electrical Engineering (IJCSEE)* (1:1), pp 1-10.

Isom, P., and Holley, K. 2012. *Is Your Company Ready for Cloud?* Boston, USA: International Business Machines Corporation.

Kappelman, L. 2013. "The 34th Annual Society for Information Management's (Sim) It Trends," University of North Texas, SIM's SIMposium 2013 conference.

Khajeh-Hosseini, A., Greenwood, D., Smith, J.W., and Sommerville, I. 2012. "The Cloud Adoption Toolkit: Supporting Cloud Adoption Decisions in the Enterprise," *Software: Practice and Experience* (42:4), pp 447-465.

Leavitt, N. 2009. "Is Cloud Computing Really Ready for Prime Time?," in: *computer*. IEEE Computer Society, pp. 16-21.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., and Ghalsasi, A. 2010. "Cloud Computing — the Business Perspective," *Decision Support Systems* (51:1), pp 176–189.

Miller, M. 2008. *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*. the United States of America: Que Publishing.

Myers, M.D., and Avison, D. 2002. *Studying Information Technology in Organizations: Research Approaches and Assumptions. Qualitative Research in Information Systems. Sage Publications, Ltd*. SAGE Publications, Ltd.

MYOB. 2012. "Australian Smes & Cloud Computing."

Neuman, W.L. 2010. *Social Research Methods: Qualitative and Quantitative Approaches*, (7 ed.). Pearson Higher Ed USA.

PeoplePulse. 2014. "Survey Response Rates." Retrieved 29/07/2014, 2014, from http://www.peoplepulse.com.au/Survey-Response-Rates.htm

Privacy_Act. 1988. "Privacy Act 1988," in: *119, 1988*, t.A. Government (ed.). Office_of_Australian_Information_Commissioner.

Taher, M. 2012. "Resource-Based View Theory," in: *Information Systems Theory. Explaining and Predicting Our Digital Society, Vol. 1*, Y.K. Dwivedi, M.R. Wade and S.L. Schneberger (eds.). springer, pp. 151-163.

Walsham, G. 1993. *Interpreting Information Systems in Organizations*. Wiley.

Zhang, Q., Cheng, L., and Boutaba, R. 2010. "Cloud Computing: State-of-Theart and Research Challenges. Journal of Internet Service Application," (1:1), pp 7-18.

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