Towards a Model of Cloud Computing Services for SMEs

Acklesh Prasad
School of Accountancy
Queensland University of Technology, Australia
Email: acklesh.prasad@qut,edu,au

Peter Green
School of Accountancy
Queensland University of Technology, Australia
Email: p.green@qut.edu.au

Jon Heales
UQ Business School
University of Queensland, Australia
Email: j.heales@business.uq.edu.au

Glen Finau
School of Accounting and Finance
University of the South Pacific, Fiji
Email: finau_g@usp.ac.fj

Abstract

Cloud computing can provide significant competitive advantages to the Small Medium Enterprises (SMEs) by reducing costs through a more scalable IT infrastructure model. However, the adoption of cloud based services can also entail costs and risks. The SMEs need to determine a path to adopting cloud computing services that would ensure their sustainable presence in the cloud computing environment. Extant literature on cloud computing and SMEs is a relatively new but burgeoning research area. Most papers in this field are normative in nature and lack empirical validation. Through a mixed-methods design, we develop and test a model of cloud computing adoption by the SMEs. This model will assist SMEs adopting a cloud-based strategy for sustainable improved business performance.

Keywords

Cloud computing services, small to medium enterprises, resource-centric theories, innovation, security

INTRODUCTION

Cloud computing services is an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location (Marston et al., 2011). Cloud computing is an example of the IT provisioning model (Böhm et al., 2011). However, cloud computing represents a shift from the traditional product-based IT provisioning model (for example, outsourcing) to a service-based provisioning model (Armbrust et al., 2010). There are predictions that the global market for the CCS will grow rapidly in the next few years. For example, the global research firm IDC predicts a compound annual growth rate of 27.4 per cent in public cloud services up to 2014, rising to a total global market value of over US$55 billion (IDC Group, 2011). Other major IT research and advisory firms predict that CCS will grow as much as five times faster than traditional IT services. This situation indicates that greater varieties of CCS are being provided to the market, much of which will benefit the SMEs. The definition of the SMEs varies in different countries and economic zones. For the purposes of this study we adopt the Australian Bureau of Statistics definition which defines SMEs as businesses with less than 200 employees. The Australian Taxation Office (ATO) also defines SMEs as economic groups with a turnover of up to $250 million. SMEs play a critical role in Australia, accounting for 96 per cent of all private businesses in Australia (DISR, 2010).

While CCS is a major game changer for SMES, there also exist a number of constraints to adopting the CCS. These constraints include data, information, and channel security, vendor dependency and privacy and ownership of organizational resources (Brender and Markov, 2013). The perceived benefits, however, appear to outweigh these inherent constraints, and they appear to compel the SMEs to look towards the cloud for their IT resource requirements. However, the SMEs need to determine their path and establish their pace of seeking the CCS. This consideration is important because lack of control and understanding on adopting the CCS could result in serious financial and operational stress for the SMEs and exposure to the stated constraints. While there are ample discussions and deliberations on the benefits of the CCS to the SMEs (see for example, Armbrust et al., 2010; Brender and Markov, 2013; Marston et al., 2011), extant literature has not focused much on how the SMEs should determine the path to adopting the CCS. Thus, we address the following key questions in this paper: (1) What

factors should the SMEs consider when deciding a path to adopting the CCS? (2) What are the matrices to determine the success of the cloud computing service initiatives of the SMEs?

First, we adopted an interpretive design to address the first research question. We analysed the extant literature, deliberations from the practice, and available views of the SMEs that are the first movers to adopt the CCS to identify the path to the CCS. Our findings suggest that the SMEs need to have a strategic and incremental intent, understand their organizational structure, understand the external factors, consider the human resource capacity, and understand the value expectations from the CCS to forge a path to adopting the CCS. Using these factors, we then propose a model for adopting the CCS by the SMEs. We suggest these considerations will contribute to the SMEs business objectives of adopting the CCS. These objectives include creativity and innovation in products and customer service, the simplification of business processes, improvement in security and risk management, better integration of business processes with the key partners, and sustainable progress in modernizing the business processes. We also suggest that these business objectives will contribute to the achievement of cloud computing-related financial objectives of a better return on their IT investment, an increased lifecycle cost of their IT deliverables, better response to financial distress and economic slowdown, and a better response to growth and expansion opportunities. Field survey data from the SMEs indicates that their consideration of the suggested factors for a path to adopting the CCS contributes directly to achieving their business objectives and indirectly to achieving their financial objectives.

The rest of this paper is organized as follows. We firstly present the study's theoretical framework. We then discuss our findings of the interpretive stage our mixed methods study. We then present our theory and hypotheses development. We then propose and validate our research model with a field survey. The last section suggests directions for future research, and states our contributions to theory and practice.

THEORETICAL FRAMEWORK

The Technological-Organizational-Environmental (TOE) is the study's theoretical framework (Tornatzky and Fleischer, 1990). The TOE framework provides guidance about how organizations form intentions to adopt information technology (IT). While the CCS are not a radically new form of technological innovation, the fact that its adoption would significantly affect organizations' business processes and data management means organizations need a strategy to adopt these resources. Tornatzky and Fleischer (1990) posit that technological, organizational and environmental variables influence an organization's intention to adopt IT.

The TOE is useful in investigating the adoption of IT innovations at the organizational level (Nguyen, 2009; Sultan, 2013). The technology factors focus on perceptions on various aspects of technology that influence its adoption. Organizational factors relate to attributes of the organization that may impact the adoption decisions. Environmental factors relate to the surroundings in which the organization conducts business that may affect adoption decisions (Brender and Markov, 2013, Gupta et al., 2013). These three factors are critical for the establishment and survival of the SMEs, and they would determine the extent of sourcing the IT resources from the cloud computing service providers.

The CCS environment has matured steadily over the years. However, the stated concerns of data and channel security, vendor dependency (Marston et al., 2011, Armbrust et al., 2010), and privacy and ownership of organizational resources (Takabi et al., 2010) means that there is a need for a better understanding of the various technological, organizational and environmental factors to decide a path for adopting the CCS for the SMEs. The next section presents the study's research design to identify these factors.

KEY CONSIDERATIONS FOR ADOPTING THE CLOUD COMPUTING SERVICES BY THE SMES

We collated data from the practice-based commentaries, the academic commentaries, and the shared experiences of the SMEs that have adopted the CCS to determine the key considerations for adopting CCS for the SMEs. This process entails a triangulation approach as part of an interpretive design. An interpretive study (Yin, 1994) is useful to unpack the diversity of issues involved in taking a path to adopting the CCS. This approach allows one to consider the shared meanings and experiences of people involved (Walsham, 1995), in this case, the cloud computing stakeholders on the appropriate path to adopting the CCS for the SMEs.

First, we collated various academic commentaries and publications on the cloud computing environment relating to the SMEs. We used keywords such as "cloud computing for SMEs", "cloud for the mid-market", "CCS", "cloud

computing platform", "cloud infrastructure", "cloud computing management", and "service-oriented architecture" to filter the cloud computing commentaries and publications from the IEEE Xplore Digital Library, the Science Direct, and the Business Source Elite databases. Second, we searched the Internet with similar keywords to obtain the practice-related commentaries on CCS for the SMEs. Third, we used search terms like cloud computing success stories for SMEs, cloud computing for the mid-market, cloud computing tips for SMEs, and competing with cloud for SMEs to search the Internet for stories and commentaries on cloud computing by the SMEs that have adopted the CCS and the cloud computing service providers.

We summarized and tabulated the deliberations from the three sources on CCS for the SMEs. We then analyzed the summarized data, resulting in a number of factors to consider towards a path to CCS for the SMEs. The factors emerged using the steps suggested by Dey (1993). These steps included establishment of the units of analysis, code attachment, and conception categorization into broader conceptions. Our analysis of the various sources of data revealed that the SMEs should have a strategic and incremental intent, understand their organizational structure, understand the external factors, consider the human resource capacity, and understand the value expectations to forge a path to adopting the CCS. These factors are presented in figure 1 below:

Fig 1. A Path to Cloud Computing Services for the SMEs
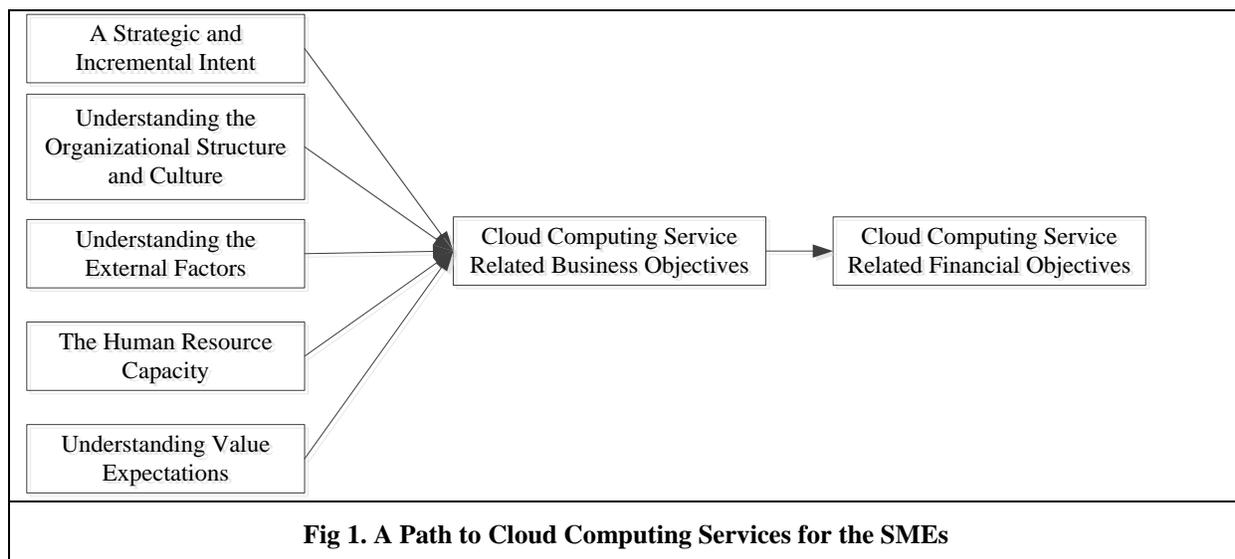
We discuss these factors in the following section.

HYPOTHESIS DEVELOPMENT

Strategic and Incremental Intent and Cloud Computing Service-Related Business Objectives

The strategic value of the IT resources is well noted in the extant literature (see for example, Kearns and Lederer, 2003, Powell and Dent-Micallef, 1997, Pavlou and El Sawy, 2006). Powell and Dent-Micallef (1997) argued that while the IT resources may be generic, investing in them is a strategic necessity for organizations. This situation is because the IT resources are the key enablers of business process transformations. These transformations are possible when organizations invest in the generic IT resources and leverage them with their IT-related capabilities (Wade and Hulland, 2004) to generate performance differentiating value. Two factors require consideration relating to the investment in IT resources in organizations. First, while the IT resources relate directly to business processes (Dehning and Richardson, 2002, Tallon, 2007), the decision to acquire them must align to the strategic objectives of the organization. That is, the decision to innovate business processes with the IT resources is aligned with the strategic intents of the organization. Second, the competitive environment requires continuous investment in IT resources. Organizations would need to ensure optimal process performance to remain competitive, and in most cases, the IT resources would be the significant contributing factor.

For the SMEs, the decision to source the CCS should also relate to their strategic visions. The decision to source the CCS is a significant IT investment decision for the SMEs, and it will change the IT infrastructure landscape of the organization (Peiris et al., 2010). Such a decision must relate the value the SMEs recognize in the IT resources, and

the alignment of IT investment-related decisions must relate to their strategic objectives. The IT adoption intensity is an important factor in the success of IT-related business transformations (Ravichandran, 2000). For the SMEs, the adoption intensity relates to ensuring an assured and manageable path to business process improvements. This situation is especially pertinent because of the inherent concerns of adopting the CCS, which include compatibility of the cloud with organizational policies, the IS development environment, the business needs, and the relative advantages of adopting cloud solutions (Lin and Chen, 2012). An incremental approach would ensure an appropriate learning trajectory, and a better understanding of the CCS that align best with the strategic objectives of the SME. Thus, for the SMEs, an incremental intent in adopting the CCS relates to the progressive transformation of the business processes. Consistent with the above arguments, we hypothesize that:

H1:   Adopting the cloud computing services with a strategic and incremental intent will contribute to the cloud computing service-related business objectives of the SMEs.

Understanding the Organizational Structure and Culture and Cloud Computing Service-Related Business Objectives

Organizational culture has been identified as a key determinant of success of various business initiatives (Büschgens et al., 2013, Denison and Mishra, 1995). Organizational culture can be defined as a "complex set of values, beliefs, assumptions and symbols that define the way in which a firm conducts its business" (Barney, 1986). Safford (1988) describes the core of the organizational culture as shared values, with cultural strength describing the extent to which values are shared by organization members. Culture determines organizational values, which should lead to a congruence of the goals of management and individual employees. Thus, culture exhibits an important coordinative function because the activities of individuals play a fundamental role in shaping innovation processes (Büschgens et al., 2013).

An appropriate organizational culture will also result in a more planned and coordinated approach to adopting the CCS (Holland et al., 1992, Iyer et al., 2008). An important consideration when implementing change is the understanding and control of the organization's risk appetite. This understanding will ensure that the level of the change is consistent with the internal and external risk environment, and the organization has taken measures to assure a reasonable and acceptable outcome from the change process. For the adoption of the CCS, this consideration would set an appropriate pace of adoption that is consistent with the expectations of all concerned parties. The above organizational culture and related considerations will have a direct impact on the effectiveness of the CCS of the business processes. Consistent with the above arguments, we hypothesize that:

H2:   Appropriate consideration of the organizational structure and culture will contribute to the cloud computing service-related business objectives of the SMEs.

External Factors and Cloud Computing Service-Related Business Objectives

The culture of cloud computing service providers outside of the adopting organization also requires careful consideration. The cloud computing service development is a complex process, and requires consideration on various aspects of product development (Hsinkuang et al., 2012, Sultan, 2014, Wei et al., 2014, Sultan, 2013, Marston et al., 2011, Takabi et al., 2010). Adoption of the CCS means organizations have to consider risks that are external to their organization. Yet, these risk factors will impact on the sustainability of the CCS for the SMEs. For example, the operational risks of the cloud computing service providers will be absorbed into the product sourced by the consumers. The inherent level of dependency on the service providers means that organizations will need to continuously manage these risks (Lian et al., 2014, McGladrey, 2013).

Organizations' need to operate in a collaborative setting continues to increase (Han et al., 2012, Tafti et al., 2013, Ziggers and Tjemkes, 2010). This situation means that internal innovation should be considered in a collaborative context. For the SMEs, this situation resonates to understanding the impact of adopting the CCS on their collaborative efforts. The level of system integration will play a critical role in improving the internal processes, and will also aid in identifying new opportunities with the strategic partners (Prasad et al., 2013).

The considerations of these external factors will ensure that the SMEs will adopt the CCS in the most feasible way. The intermediaries will ensure the best-fit cloud service, which fits the risk appetite of the organization, promote innovation by encouraging external collaboration, and there will be greater awareness of the exposure to the inherent risk of the cloud computing environment. The awareness of these issues will ensure sustained leverage of the

acquired CCS by the SMEs, which will assist them in meeting their adoption objectives. Consistent with the above arguments, we hypothesize that:

H3:   Appropriate consideration of the external factors will contribute to the cloud computing service-related business objectives of the SMEs.

The Human Resource Capability and Cloud computing Service-Related Business Objectives

The successful adoption and use of the IT resources requires the appropriate interaction between people, processes and technology (Ahituv et al., 1984). The nature of human interactions includes their participation in the planning process, supporting the technology use, and the provision of adequate training to use the IT resources. While the CCS are a packaged IT resources, it still requires appropriate human interaction inside of the organization to ensure its successful and sustainable leverage (Lian et al., 2014, Roepke et al., 2000). The SMEs would need to lead their path to successful adoption of the CCS, and the involvement of the organizational human resources would be a key determining factor in this success.

The arguments of the resource centric view of the firm (Wade and Hulland, 2004, Barney, 2001) relates well to this situation. The SMEs would need to develop a capability of using the CCS. That is, the SMEs must find a way to leverage the adopted CCS in unique ways. The cloud intermediaries may assist in obtaining the best CCS package, but the unique fit of the service package will be achieved internally. This achievement will require a trajectory of the involvement of the human resources, which would eventually develop their cloud computing-related human resource capability. The involvement of the human resources in the CCS adopting planning process is vital (Hitt et al., 2001). This involvement ensures initial appreciation of technology and facilitation of the IT-business alignment in the organization (Preston and Karahanna, 2009, Kearns and Sabherwal, 2007). The introduction of new IT resources means new ways of interacting with the business processes. While the end-users will be able to transfer most of their technical competencies to the new environment, some level of training is necessary. End-user training has been crucial in the successful implementation of information systems (Bostrom and Olfman, 1990). Managing the IT expenditure has been the key impetus for acquiring the IT resources as a utility. However, the sustainable use of the CCS would require some commitment of this saving to the technical human resources. This effort will provide incremental benefit to the organization. The coordinated engagement of the human resources in the CCS adopting process by the SMEs will ensure a swift transformation of the business environment, and a sustainable approach to building cloud computing service-related capabilities. These efforts will assist the SMEs in achieving their cloud computing related business objectives. Consistent with the above arguments, we hypothesize that:

H4:   Appropriate consideration on the human resource capabilities will contribute to the cloud computing service-related business objectives of the SMEs.

Value Expectations and Cloud computing Service-Related Business Objectives

Much of the disappointment from investment in the IT resources in the past stemmed from a mismatch between the time and value expectation from the IT resources. Early thoughts were that IT resources would provide an immediate contribution to firm-level performance. The thought that appropriate leverage of IT resources provides value saw organizations combining and complementing the IT resources with other resources (Barua et al., 1996, Barua and Mukhopadhyay, 2000). It was also established that the combination of resources should provide a unique environment for an organization to ensure unique leverage of the IT resources. That is, organizations need to combine their unique IT-related capabilities with their generic IT resources to ensure unique IT-related business value (Melville et al., 2004, Tallon, 2007). It was also established that leverage of IT resources takes place at the business process level, and initial IT-related business value should be considered at this business process level (Dehning and Richardson, 2002). A sustained level of performance of the business processes would contribute to the firm-level performance of the organization (Dehning and Richardson, 2002).

The SMEs would need to revisit these analogies to understand the value expectations of the CCS before they determine their path to acquiring these services. An understanding of the value expectations would assist with identifying the appropriate service package. This understanding will also assist them in prioritizing their business processes, and innovating those business processes that are consistent with their value expectations from the CCS. The value expectations will also provide control to the SMEs on the nature of the CCS that they require, which will provide better authority to negotiate service agreements with the service providers and the intermediaries. These

factors and considerations will mean that the SMEs have a proactive approach to adopting the CCS, and are more likely to meet their set business-related objectives of adopting the CCS. Consistent with the above arguments, we hypothesize that:

H5:   An understanding of the value expectation of the cloud computing services will contribute to the cloud computing service-related business objectives of the SMEs.

Cloud Computing Service and Business and Financial Objectives

The investment in the CCS is a strategic decision, with anticipation of strategic value-related outcomes. Investment in the CCS is a way to manage the cost of development and management of its IT infrastructure (Marston et al., 2011, Iyer et al., 2013, Kalyvas et al., 2013).Over time, the SMEs will make a substantial capital commitment in the CCS. The preceding discussion suggests how various considerations on the CCS could facilitate an appropriate path to acquiring the CCS for the SMEs, and for them to achieve their set business objectives. A sustained level of benefits from the CCS will eventually reflect on the overall performance of their IT infrastructure. This will include a better return from the investment in the CCS, and a more robust IT infrastructure that could assist in their development efforts. Thus, a proactive approach to adopting the CCS will ensure a sustained level of benefits at the business process level, and subsequent benefits to the overall organization relative to their investment in the IT resources. Consistent with the above arguments, we hypothesize that:

H6:   The cloud computing service-related business objectives of the SMEs will contribute to the cloud computing services-related financial objectives.

RESEARCH DESIGN

Research Approach and Instrument Development and Test

We validated the proposed research model with a field survey. The field survey allows data collection from a broad area, and is the best way to reach geographically dispersed contacts.

We identified five factors that the SMEs can consider for their path to adopting the CCS. Validated measurement items for these factors did not exist. Thus, we had to develop new measurement items for these factors to include them as constructs in the research model. We followed the well documented approach of Davies (1989) and Moore and Benbasat (1991), where we pooled the measurement items, eliminated, sorted and refined the items, and conducted a pilot test on the final set of items. We revisited our interpretive data to pool ten measurement items for each factor. We sought assistance from six fellow faculty colleagues and post graduate students with interest and expertise in the subject matter to sort and refine the constructs' measurement items. This process led to elimination and refinement of the measurement items. The sorting inter-rater scores, the Cohen's Kappa (κ), of the refined pool of measures indicated that inter-rater reliability for the participants was within the full agreement range (κ = 0.60 – 0.80) or within an almost perfect agreement (κ = 0.81 – 1.00). The outcome of this sorting and subsequent refinement process was a set of near-final measurement items for each construct. We then sought assistance from twelve fellow colleagues and other graduate students who did not participate in the initial item sorting process to pilot test our survey research instrument. They shared some issues with the framing of the questions, which we addressed to develop our final research instrument.

Sample Frame Construction and Survey Administration

We obtained the contact details of the SMEs from the ORBIS database. ORBIS is a publication of Bureau van Dijk Electronic Publishing (BvDEP). For survey administration reasons, we limited our sampling frame to a single country - Australia. The business and technology adoption environment in Australia is consistent with those of other developed economies. We used the Australian definition of SME and selected all organizations with less than 200 employees or as per the Australian Taxation Office (ATO) define: economic groups with turnover of up to $250 million. We used both matrices to include the most number of organizations in our sampling frame. To avoid sending more than one instrument to a contact person/organization, we examined organizations' subsidiary and partnership relationships. We evaluated the database for such relationships, and also examined their Websites for associations and affiliations.

We adopted Dillman's (2007) methodology to develop and administer the online research instrument. The email link on the covering email note directed the potential respondents to access the survey questions. We approached the

contacts with an initial instrument package delivery via email and two email reminders. The email contained the link to the survey. At the conclusion of the instrument administration process, we received 136 valid responses. We aimed to obtain responses from the SMEs that have adopted or are planning to adopt the cloud computing services because they would have considered the situations on which we are seeking their perceptions. However, we were unable to identify these organizations from our sampling frame. For this reason, we are unable to determine the actual response rate of our field survey. Furthermore, we have collected enough data to test our suggested model.

Descriptive Statistics and Diagnostic Checks

Table 1 presents the demographic information on the industry sector and the position of the contacts that responded to the survey. The contacts responded to the survey from most major industry sectors, and occupied various senior and middle management positions in their organization. Seventy-five percent of the responses were received from organizations that have 75 or more employees. Most respondents are aged 30 years and over, and most of their organizations have been in existence for more than 10 years.

Table 1. Industry and Respondent Demographics ($n = 136$)

Industry Sector	Frequency	Position	Frequency
Construction	10	Owner/Manager	15
Retail	25	Unit/Section Manager	26
Education	6	Chief Information Officer	30
Financial Services	30	Chief Technology Officer	11
Manufacturing	20	IT Manager	6
Telecommunications	6	Chief Financial Officer	18
Transport	11	Senior Accountant	12
Other Services	15	Senior Business Analyst	3
Others	13	Chief Executive Officer	7
		Others	8

An ANOVA test ($p<0.05$) was used to test for non-response bias with the first and the last thirty responses for all measures. We used the contacts that responded after the second reminder as the proxy for non-responders (Armstrong and Overton, 1977). The results showed no significant differences on any of the variables of the study. A small number of responses contained missing data, and Little's MCAR test found the data to be missing completely at random ($p=0.354$). Maximum likelihood estimation (MLE), implemented by the EM (expectation maximization) algorithm in the SPSS Missing Values option, imputed the missing data.

RESULTS

Measurement Properties of Data

The factor loadings for all measurement items were above the rule of thumb 0.70, indicating at least 50% of the variance in the manifest variable is accounted for by the construct (Hair et al., 2008). Cross-loadings analysis revealed manifest variables load highly only on the desired latent variable. We also evaluated other measurement properties of data, including Cronbach's alpha, the average variance extracted (AVE), the composite reliability, and the inter-construct correlations. The alpha coefficients of all constructs were higher than 0.70 (Nunnally, 1978). The average variances extracted were all above the 0.50 level (Chin, 1998). The square root of the average variances extracted, which represents the average association of each construct to its measures, was higher than the correlations between the constructs indicating that the constructs closely relate to their own measures rather than to those of other constructs. These outcomes ensured the discriminant and convergent validity of data. Table 2 summarizes the outcome of this analysis.

Table 2. Measurement Properties of Data

	AVE	CR	CA	CBO	CFO	HRC	SII	UEF	UOC	UVE
CBO	0.642	0.900	0.860	0.801						
CFO	0.688	0.898	0.848	0.608	0.829					
HRC	0.770	0.910	0.851	0.470	0.384	0.878				
SII	0.775	0.932	0.904	0.458	0.327	0.329	0.880			
UEF	0.698	0.902	0.855	0.537	0.336	0.491	0.375	0.835		
UOC	0.839	0.940	0.904	0.524	0.381	0.443	0.560	0.515	0.916	
UVE	0.700	0.875	0.785	0.585	0.394	0.476	0.654	0.539	0.733	0.837

AVE - Average Variance Extracted, CR – Composite Reliability, CA -Cronbach's Alpha, CBO- Cloud-Related Business Objectives, CFO - Cloud-Related Financial Objectives, SII - Strategic and Incremental Intent, HRC- Human Resource Capacity, UOC - Understanding Organizational Culture, UVE- Understanding Value Expectations, UEF - Understanding External Factors

Structural Properties of Data

Table 3 below shows the outcome of the assessment of the structural properties of data. We hypothesized through H1-5 that the five cloud computing service adoption considerations would relate positively to the cloud computing service-related business objectives of the SMEs. The path coefficients of each of the considerations indicate a positive and significant relationship with the cloud computing service-related business objectives. The association is stronger between understanding the external factors (UEF) (p-value 0.241, t-value – 2.846) human resource capacity (HRC) (p-value 0.161, t-value – 2.696), and understanding the value expectations (UVE) (p-value 0.243, t-value – 2.597). Together, the five considerations explain 44.3% variance in the cloud computing service-related business objectives. Data supports H1-H5.

Table 3. Adoption Considerations and Cloud Computing Services-Related Business Objectives

Relationship	Hypothesis	Path Coefficient	t-value
SII → Cloud Business Objectives (CBO)	H1	0.196	1.984*
OUC → Cloud Business Objectives (CBO)	H2	0.193	1.973*
UEF → Cloud Business Objectives (CBO)	H3	0.241	2.846**
HRC → Cloud Business Objectives (CBO)	H4	0.161	2.696**
UVE → Cloud Business Objectives (CBO)	H5	0.243	2.597**
Explained Variance (R^2)		44.30%	

*$p< 0.05$ **$p<0.01$ ***$p< 0.001$

We also hypothesized that the cloud computing service-related business objectives would relate positively to the cloud computing service-related financial objectives of the SMEs. Table 4 shows the outcome of the assessment of this aspect of the structural model. There was a positive and a significant association between the cloud computing service-related business objectives, and the cloud computing service-related financial objectives, with a total explained variance of 36.90%. Data supports H6.

Table 4. Cloud Business Objectives and Cloud Financial Objectives

Relationship	Hypothesis	Path Coefficient	t-value
Cloud Business Objectives - Cloud Financial Objectives	H6	0.608	11.243***
Explained Variance (R^2)	36.90%		

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

DISCUSSION

The SMEs are an important group of organizations in any economy. Their contribution has a significant impact on the livelihood of communities, meaning the continuity of their operations is vital in any economy. The business environment is changing continually. A significant challenge for organizations is the need to modernize their business processes to ensure competitive value for their product and services. IT is an important enabler of activities that transforms the business process. However, continuous investment in IT resources puts significant strain on the financial health of an organization. This situation is especially concerning to the SMEs. The availability of the IT resources as a utility – the cloud computing services is an important change in the way organizations could acquire the IT resources. While the larger organizations may absorb adopting the IT resources in this new environment, the SMEs require considerations before they embrace on a path to adopting the cloud computing services.

We posit that SMEs should be proactive in their approach to adopting the cloud computing services. That is, the SMEs need to be aware of the surrounding internal and external circumstances before they start to incorporate the cloud computing services into their business process. This effort is especially pertinent because a change in the approach to adopting the IT resources is a significant event in an organization, and it will impact their core activities of producing the goods and services. With hypothesis 1, we suggested and data supported that the adoption of the cloud computing services should be part of a strategic intent. The SMEs need to see the fit of their intent of adopting the cloud computing services to their strategic objectives. This awareness would ensure that their use of the cloud computing services is sustainable. Furthermore, the SMEs need to determine their pace of adopting the cloud computing services. An incremental intent fits well with the resource constraints of the SMEs. This approach will also ensure that the SMEs engage in a learning process, and develop better ways to adopting the cloud computing services.

We also hypothesized with H2 and H4 of understanding the internal and the external environment. These considerations relate to the awareness of the surrounding environment, which will assist in establishing a trajectory to adopting the cloud computing services. Understanding internal factors, which includes the organizational culture is important as it determines organizational readiness to change. The SMEs need to evaluate the importance it places on the enabling nature of the IT resources. This understanding will influence the success of new IT-related initiatives, including the cloud computing services. Other internal considerations will contribute to determining the depth and breadth of the service adoption process. For example, opportunities for mergers and acquisitions in the near future will mean that the SMEs cloud-related business processes should have the capacity to integrate with the business processes of the acquired organizations. Considerations of the external factors are also equally important. The lock-in and dependency cost of the cloud computing services could be significant. The SMEs need to be aware of the most appropriate way to engage in the process of acquiring the cloud computing services. The cloud-service intermediaries have significant negotiating power, and have the necessary expertise on the appropriateness of the cloud products for different forms of organizations. Considerations of the legal and regulatory environment are also important, as this will determine the applications that could be sourced from the cloud, and data that could be shared with the cloud service providers.

New ways of managing the business processes will result in organizational learning over a period of time. The role of the technical human resources is important in this exercise. This situation means that organizations need to be proactive in readying themselves to adopt the cloud computing services. The SMEs will also need to ensure that they have the internal capacity to swiftly fit and leverage the acquired cloud computing services in their organizations. Through Hypothesis 3, we suggested that ensuring appropriate human resource capacity is a critical consideration in adopting the cloud computing services. Even though the cloud computing services would be adopted as a utility, it is

the SMEs responsibility to ensure that the utility presents the best value to the organization. The management of the business processes will change with the cloud computing services. The end users will experience new applications, and new forms of entering, storing, and accessing data. An appropriate level of support in understanding the changed environment, and the guidance in managing the changed business process will be a critical factor in ensuring the success of the SMEs with their cloud computing service initiatives. Data indicates that appropriate human resource capacity is an important consideration in adopting the CCS.

Many IT investment decisions have been perceived to be unsuccessful because of the misfit between the trajectory of the business value of these IT investments, and the value expectations of the organization. The adoption of the cloud computing services will present the same value expectation challenges to the SMEs. Through hypothesis 5, we suggested that the SMEs need to understand and agree to the trajectory of value expectations of the CCS. This understanding will mean that the SMEs are able to relate better their intentions of adopting the cloud computing services their IT and business strategies. The understanding of the value expectations will also assist the SMEs in developing a plan to transform their business processes with the CCS. The survey respondents perceived understanding the value expectations as an important consideration in their plan to adopt the CCS.

RESEARCH LIMITATIONS

Readers may consider the following issues when interpreting the outcomes of this research. First, we did not focus on a specific cloud computing service, the cloud computing services from a specific vendor, or the SMEs from a specific sector. These situations may present some bias to the research outcomes owing to comparisons of cloud computing services in different business environments and from different service providers. However, despite the varied environment or the service providers, their key considerations for adopting the cloud computing services would be the same. Second, despite rigorous attempts to validate the perceptive measures, and careful administration of the survey instrument, perceptions are susceptible to bias and error. However, we envisage our efforts have minimized these errors and biases. Lastly, while we would have preferred to use objective measures of business and financial objectives, published data for these measures is difficult to obtain.

CONCLUSION

The SMEs have an excellent opportunity to modernize their business processes by acquiring the IT resources as an affordable utility. However, the vulnerable nature of the SMEs and their importance in any economy means there is a need for careful consideration of various factors before establishing a path to adopting the CCS. We have provided suggestions on the factors that the SMEs should consider when planning to adopt the CCS. These considerations relate to the strategic intent of SMEs, understanding the internal and the external factors, ensuring adequate human resource capacity to introduce and manage the use of the CCS, and understanding the value expectations from the CCS. With these considerations, the SMEs will have a better chance to manage the CCS adoption process, and they will be in a better position to manage the inherent risks associated with acquiring the IT resources from the cloud computing environment. We also suggested that these considerations would ensure that the SMEs would be able to achieve their cloud computing services-related business objectives, and indirectly their cloud computing services-related financial objectives. We hope our effort will increase the understanding on ways to approach the adoption of the cloud computing services by the SMEs. This understanding will ensure that the acquired IT resources contribute to the strategic intent of SMEs, and swiftly fit into their existing business processes.

REFERENCES

Ahituv, N., Hadass, M. & Neumann, S. (1984) A Flexible Approach to Information System Development. *MIS Quarterly,* 8**,** 69.

Armbrust, M., Fox, A., Griffith, R., Joseph, A.D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., Zaharia, M. A. (2010) View of Cloud Computing. *Communications of the ACM*; 53 (4): 50-58.

Armstrong, J. S. & Overton, T. (1977) Estimating Nonresponse Bias in Mail Surveys. *Journal of Marketing Research***,** 396-402.

Barney, J. (2001) Is the Resource-Based View a Useful Perspective for Strategic Management Research? Yes. *Academy of Management Review.*

Barney, J. B. (1986) Organizational Culture: Can it be a source of sustained competitive advantage? *Academy of Management Review,* 11**,** 656-665.

Barua, A., Lee, C. H. & Whinston, A. B. (1996) The Calculus of Reengineering. *Information Systems Research,* 7**,** 409-428.

Barua, A. & Mukhopadhyay, T. (2000) Information Technology and Business Performance: Past, Present, and Future. In Zmud, R. (Ed.) *Framing the Domains of IT Management: Projecting the Future through the Past.* Cincinnati, OH, Pinnaflex Inc.

Böhm, M., Leimeister, S., Riedl, C., Krcmar, H. Cloud Computing – Outsourcing 2.0 or a New Business Model for IT Provisioning? (2011) In: F. Keuper, C. Oecking and A. Degenhardt eds. Application Management. Gabler, 31-56.

Bostrom, R. P. & Olfman, L. (1990) The importance of learning style in end-user training. *MIS Quarterly,* 14**,** 100.

Brender, N., Markov, I. (2013) Risk Perception and Risk Management in Cloud Computing: Results from a Case Study of Swiss Companies. *International Journal of Information Management*; 33 (5): 726-733.

Büschgens, T., Bausch, A. & Balkin, D. B. (2013) Organizational Culture and Innovation: A Meta-Analytic Review. *Journal of Product Innovation Management,* 30**,** 763-781.

Chin, W. (1998) Issues and opinions on structural equation modelling. *MIS Quarterly,* 22**,** 7,10.

Davis, F. D. (1989) Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly,* 13**,** 319-340.

Dehning, B. & Richardson, V. J. (2002) Returns of Investment Technology: A Research Synthesis. *Journal of Information Systems,* 16**,** 7-30.

Denison, D. R. & Mishra, A. K. (1995) Toward a theory of Organizational culture and effectiveness. *Organization Science.*

Dey, I. (1993) *Qualitative Data Analysis: A User-Friendly Guide for Social Scientists* London, Routledge.

Dillman, D. A. (2007) *Mail and Internet Surveys: The Tailored Design Method,* NY, John Wiley & Sons.

DISR (2010) Small to Medium Enterprises and Productivity. . *Department of Innovation Science and Research*.

Gupta, P., Seetharaman, A., Raj, J.R. (2013) The Usage and Adoption of Cloud Computing by Small and Medium Businesses. *International Journal of Information Management*; 33 (5): 861-874.

Hair, J., Anderson, R., Tatham, R. & Black, W. (2008) *Multivariate Data Analysis* Prentice Hall.

Han, K., Oh, W., Im, K. S., Oh, H., Pinsonneault, A. & Chang, R. M. (2012) Value Cocreation and Wealth Spillover in Open Innovation Alliances. *MIS Quarterly,* 36**,** 291-316.

Hitt, M. A., Biermant, L., Shimizu, K. & Kochhar, R. (2001) Direct and Moderating Effects of Human Capital on Strategy and Performance in Professional Service Firms: A Resource-Based Perspective. *Academy of Management Journal,* 44**,** 13-28.

Holland, C., Lockett, G. & Blackman, I. (1992) Planning for Electronic Data Interchange. *Strategic Management Journal.*

Hsinkuang, C., Hueryren, Y. & Wei-Chien, H. (2012) The Moderating Effect of Subjective Norm on Cloud Computing Users' Perceived Risk and Usage Intention. *International Journal of Marketing Studies,* 4**,** 95-102.

IDC Group (2011) "Cloud Computing in the Midmarket : Assessing the Options,".

Iyer, E. K., Krishnan, A., Sareen, G. & Panda, T. (2013) Analysis of Dissatisfiers That Inhibit Cloud Computing Adoption Across Multiple Customer Segments. *Proceedings of the European Conference on Information Management & Evaluation***,** 145-151.

Iyer, L., Aubeterre, F. D. & Singh, R. (2008) A Semantic Approach to Secure Collaborative Inter-Organizational eBusiness Processes (SSCIOBP). *Journal of the Association for Information Systems,* 9.

Kalyvas, J. R., Overly, M. R. & Karlyn, M. A. (2013) Cloud Computing: A Practical Framework for Managing Cloud Computing Risk--Part I. *Intellectual Property & Technology Law Journal,* 25**,** 7-18.

Kearns, G. S. & Lederer, A. L. (2003) Resource-Based View of Strategic IT Alignment: How Knowledge Sharing Creates Competitive Advantage. *Decision Sciences,* 34**,** 1-28.

Kearns, G. S. & Sabherwal, R. (2007) Strategic Alignment between Business and Information Technology: A Knowledge-Based View of Behaviours, Outcome, and Consequences. *Journal of Management Information Systems,* 23**,** 129-162.

Lian, J.-W., Yen, D. C. & Wang, Y.-T. (2014) An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital. *International Journal of Information Management,* 34**,** 28-36.

Lin, A. & Chen, N.-C. (2012) Cloud computing as an innovation: Perception, attitude, and adoption. *International Journal of Information Management,* 32**,** 533-540.

Lu, Y. & Ramamurthy, K. (2011) Understanding the Link between Information Technology Capability And Organizational Agility: An Empirical Examination. *MIS Quarterly,* 35**,** 931-954.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. & Ghalsasi, A. (2011) Cloud computing — The business perspective. *Decision Support Systems,* 51**,** 176-189.

Mcgladrey (2013) Cloud Risks: Striking a Balance between Savings and Security. *White Paper.*

Melville, N., Kraemer, K. & Gurbaxani, V. (2004) Information Technology and Organizational Performance: An Integrative Model of IT Business Value. *MIS Quarterly,* 28**,** 283-321.

Moore, G. C. & Benbasat, I. (1991) Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research,* 2**,** 192-222.

Nguyen, T.H. (2009) Information Technology Adoption in SMES: An Integrated Framework. *International Journal of Entrepreneurial Behaviour & Research*; 15 (2): 162-186.

Nunnally, J. C. (1978) *Psychometric Theory,* New York, NY, McGraw-Hill.

Pavlou, P. A. & El Sawy, O. A. (2010) The Third Hand: IT-Enabled Competitive Advantage in Turbulent Environments. *Information Systems Research.*

Peiris, C., Balachandran, B., Sharma, D. (2010) Governance Framework for Cloud Computing. *International Journal on Computing*; 1 (1): 88-93.

Powell, T. C. & Dent-Micallef, A. (1997) Information Technology as Competitive Advantage: The Role of Human, Business, and Technology Resources. *Strategic Management Journal,* 18**,** 375-405.

Prasad, A., Green, P. & Heales, J. (2013) On Governing Collaborative Information Technology (IT): A Relational Perspective. *Journal of Information Systems,* 27**,** 237-260.

Preston, D. & Karahanna, E. (2009) Antecedents of IS Strategic Alignment: A Nomological Network. *Information Systems Research,* 20**,** 159.

Ravichandran, T. (2000) Swiftness and Intensity of administrative innovation adoption: An empirical study of TQM in Information Systems. *Decision Sciences,* 31**,** 691-724.

Roepke, R. P., Agarwal, R. & Ferratt, T. W. (2000) Aligning the IT Human Resource with Business Vision: The Leadership Initiative at 3M. *MIS Quarterly,* 24**,** 327-353.

Saffold, G. S. I. (1988) Culture traits, strength and Organizational performance: Moving beyond "strong" culture. *Academy of Management Review,* 13**,** 546-558.

Sultan, N. (2013) Cloud computing: A democratizing force? *International Journal of Information Management,* 33**,** 810-815.

Sultan, N. (2014) Making use of cloud computing for healthcare provision: Opportunities and challenges. *International Journal of Information Management,* 34**,** 177-184.

Tafti, A., Mithas, S. & Krishnan, M. S. (2013) The Effect of Information Technology–Enabled Flexibility on Formation and Market Value of Alliances. *Management Science,* 59**,** 207-225.

Takabi, H., Joshi, J. B. D. & Gail-Joon, A. (2010) Security and Privacy Challenges in Cloud Computing Environments. *Security & Privacy, IEEE,* 8**,** 24-31.

Tallon, P. P. (2007) A Process-Oriented Perspective on the Alignment of Information Technology and Business Strategy. *Journal of Management Information Systems,* 24**,** 227-268.

Tornatzky, L., Fleischer, M. (1990) The Process of Technological Innovation. Lexington, MA: Lexington Books.

Wade, M. & Hulland, J. (2004) Review: The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly,* 28**,** 107-142.

Walsham, G. (1995) The Emergence of Interpretivism in IS Research. *Information Systems Research,* 6**,** 376-394.

Wei, L., Zhu, H., Cao, Z., Dong, X., Jia, W., Chen, Y. & Vasilakos, A. V. (2014) Security and privacy for storage and computation in cloud computing. *Information Sciences,* 258**,** 371-386.

Yin, R. K. (1994) *Case Study Research: Design and Methods,* Thousand Oaks, CA, Sage Publications.

Ziggers, G. W. & Tjemkes, B. (2010) Dynamics in Inter-Firm Collaboration: The Impact of Alliance Capabilities on Performance. *Int. J. Food System Dynamics,* 2**,** 151-166.