



Investigating South African Vendors' Cloud Computing Value Proposition to Small, Medium and Micro Enterprises: A Case of the City of Tshwane Metropolitan Municipality

Research Paper

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ABSTRACT

While Small, Medium and Micro Enterprises (SMMEs) are known to contribute significantly to economic growth and reduction of unemployment worldwide, South Africa experiences high failure rate, stagnation and limited growth of SMMEs. Cloud computing, which promises cost efficiencies for SMMEs through its unique outsourcing based business model, is emerging as a viable solution and an excellent value proposition to SMMEs. This study investigated the value proposition of cloud computing vendors to South African SMMEs. The problems addressed in this research are:

- investigating whether the concept of cloud computing and its related key terms are being comprehended by South African SMMEs,
- investigating and identifying the cloud computing applications/services that are most valuable and critical to the growth and development of South African SMMEs,
- investigating and determining the main influences against adoption of cloud computing by SMMEs.

Quantitative research using questionnaires was conducted and the findings of this study *inter alia* revealed that SMMEs in South Africa do not understand the basic key terms and concepts of cloud computing.

Keywords

Cloud computing, cloud services vendors, value proposition, Small, Medium and Micro Enterprises, South Africa.

INTRODUCTION

Small, Medium and Micro Enterprises (SMMEs) have been recognized as one of the fundamental and critical pillars of economic growth and development in both the developed and developing countries. It has been shown that increases in Gross Domestic Product (GDP) and declines in unemployment were in most part attributable to SMMEs proliferation and resultant activities (Modimogale & Kroeze, 2009). In South Africa, SMMEs are estimated to contribute approximately 56% of private sector employment and 36% of GDP (the dti, 2008). As a result, the SMME sector is seen as the most prospective sector in the South African economy (Ismail, Jeffery & Van Belle, 2011; Hinde & Van Belle, 2012).

Nevertheless, South Africa has approximately 75% of new SMMEs which never result in established firms, thus, resulting in a high failure rate, stagnation and limited growth for the SMME sector (Olawale & Garwe, 2010). Consequently, the adoption of Information and Communication Technology (ICT) by SMMEs is seen as a promising dimension of ubiquitous growth. However, Information Technology (IT) skills, labor and infrastructure are acting as inhibitors to ICT assimilation and SMME expansion, as it is difficult and costly for SMMEs to hire skilled labor in South Africa as a result of labor and minimum wage regulations among other factors, while availability of infrastructure is in most part a concern (Matthews, 2007).

Cloud computing has recently emerged as a viable solution and an excellent value proposition to SMMEs for solving the problem of physical IT assets, and human resources which are sourced at a premium, (Hinde & Van Belle, 2012). As a result, cloud computing is seen as an enabler in unlocking the value of SMMEs through proliferation of pervasive growth and development. The current adoption of cloud computing is, however, associated with numerous challenges (Dillon, Wu & Chang, 2010). A study by Hinde & Van Belle (2012) indicates that a significant number of South African SMMEs still believe that cloud computing is more valuable and suitable to larger more mature markets and organizations. Thus, there is a clear indication that there are still some misconceptions about the value proposed by cloud computing technology and consequently cloud computing services vendors.

Accordingly, the objective of the research was to study a number of SMMEs within the City of Tshwane Metropolitan Municipality (CTMM) in South Africa to establish the extent to which they comprehend cloud computing basic concepts and key terms, identify applications/services that are most valuable and critical to their growth and development, and identify the main concerns influencing them not to adopt cloud computing.

BACKGROUND

Defining the SMME sector in South Africa

SMMEs in South Africa are defined according to the National Small Business Act 102 of 1996 as a separate and distinct business entity which includes co-operative enterprises and nongovernmental organizations, managed by one owner or more, including its branches or subsidiaries, if any. It is predominantly carried on in any sector or subsector of the economy (the dti, 2008). According to the dti (2008) SMMEs are categorized in South Africa as comprising of micro businesses (up to 5 employees), very small businesses (up to 20 employees), small businesses (up to 50 employees) and medium sized businesses (up to 200 employees). Goldstuck (2012) estimates that there are approximately 1.2-million to 2.4-million registered companies in South Africa. However, active entities

are estimated to be between 600,000 and 675,000; this puts Goldstuck's estimate (2012) to the total number of 650,000 active SMMEs.

The status of SMMEs in South Africa

The South African government and a significant number of major players within the SMME sector have long recognized the importance and immense potential of SMMEs in creating jobs and economic growth. This is evident from the focused strategic directions and initiatives taken by various government departments to stimulate growth in the SMME sector (Ngwenya, 2012). Ngwenya (2012) and the dti (2008) have established that the Industrial Development Corporation (IDC) has streamlined its focus on providing financial support for South African SMME's, Small Enterprise Development Agency (SEDA) under the auspices of the Department of Trade and Industry (DTI). The DTI is focusing on small business development and support services including business planning; , entrepreneurship promotion; training; franchise awareness; access to local and international markets; access to finance and access to technology; .

Khula Enterprise Finance under the auspices of the DTI is specifically focused on cases where the commercial financial institutions are not comfortable with the risk such as black owned SMMEs in rural and peri-urban areas of South Africa; . Export Marketing & Investment Assistance (EMIA) under the auspices of the DTI is focused on partially compensating exporters for costs incurred in order to get their product or service to the export market and to attract new foreign direct investment into South Africa while Business Partners Limited is focused on providing assistance in relation to business finance; mentorship and consulting services; and, property management services.

In addition, according to South Africa National Planning Commission (2011) and South Africa Economic Development Department (2011) the National Development Plan (NDP) and the New Growth Path (NGP) touted by President Jacob Zuma as the government's de-facto strategic frameworks for reducing unemployment and poverty, identify the growth and development of SMMEs as one of the critical success factors for pervasive job creation and thus poverty and unemployment alleviation.

Nevertheless, given all the development and support initiatives, the Business Environment Specialist SBP (2013) shows that SMMEs are stagnating and resulting in limited growth. They are exhibiting a modest propensity for growth in terms of turnover and an overall decline in permanent employment. For his part, Olawale & Garwe (2010) indicates that the failure rate of start-up SMMEs in South Africa is approximately 75% making it one of the highest in the world. According to the Africagrowth Institute (2012), the business confidence in SMME sector declined during the first quarter of the year 2012. The index indicates a decline of 1.9% from the fourth quarter of 2011 to the first quarter of 2012. This stagnation and limited growth implies that the anticipated goals of significantly reducing unemployment and poverty may not be realized as expected. Thus, we need unsullied and novel innovative ideas to stimulate growth and development of the SMME sector.

According to The World Bank (2008), technology is a fundamental and significantly crucial contributor to economic growth and development, as it plays a vital role in spurring income growth and therefore reducing poverty and consequently unemployment. The World Bank (2008) report further elaborates that to a larger extent technological progress is what makes the difference between fast-growing developing economies where rapid GDP per capita growth translates into rising incomes and slow-growing economies. The report also adds that technological progress has helped reduce the share of people living in absolute poverty in developing countries from 29 percent in 1990 to 18 percent in 2004.

One of the ways technology contributes to economic development is through foreign trade that is fuelled by the globalization of markets enabled by the Internet technology. Local organizations can now sell products and services in a cost effective and competitive manner to an expanded market share, including foreign markets through the use of the Internet.

According to the UNDP Evaluation Office report (2001), a skeptical few would disagree that the scope and pace of recent change is a function of revolutionary advances in technology, specifically ICTs such as mobile telephony, radio, television, Internet etc. The UNDP Evaluation Office report (2001) explains that ICTs as technology tools are able to work together, and combine to form our networked world which is able to reach every corner of the globe.

The report further adds that the potential of new ICTs lies in their capacities to instantaneously connect vast networks of individuals and organizations across great geographic distances at very little cost, and as a result, ICTs have been key enablers of globalization, facilitating world-wide flows of information, capital, ideas, people and products. ICTs have transformed businesses, markets and organizations, revolutionized learning and knowledge sharing, empowered citizens and communities, and created significant economic growth in many countries (UNDP Evaluation Office, 2001). The UNDP Evaluation Office report (2001) further elaborates that ICTs and technology in general have led to rising standards of living, literacy, health and life expectancy.

We may therefore postulate that one of the new ways to stimulate growth and development of the SMME sector is through the use of the cloud computing technology in such a way that it provides value to SMMEs by reducing costs, and thereby increasing turnover which may result in more job opportunities.

Information and communication technologies and SMME growth

The adoption of ICT has in recent years been recognized and identified as one of the innovative mechanisms that may stimulate the development and growth of SMMEs (Matthews, 2007). According to Modimogale & Kroeze (2009), ICT is the main driver of the digitalization and the evolution from the service economy to the knowledge based economy. In the knowledge based economy, knowledge is recognized as an important asset and a critical success factor that is instrumental in driving productivity and economic growth to greater levels of performance (OECD, 1996). Thus, knowledge through the use of ICTs has a greater potential in enabling SMMEs to achieve competitive advantage in the knowledge based economy era. This is evidenced by the high growth rates which were prevalent in the US economy during the 1990s, which saw productivity and employment rise as a result of the early and rapid adoption of ICTs (Modimogale & Kroeze, 2009). Therefore it is adequate to view ICTs as the essential factors of success in the age of a knowledge based economy, and that those firms that are able to leverage the rise of this type of economy by taking advantage of ICTs to achieve high levels of efficiency and effectiveness will be in a greater position to not only achieve a competitive advantage, but to sustain a competitive advantage supported by growth and expansion in both the local and international markets.

Although it is difficult to correlate the high levels of ICT usage and expansion in SMMEs, and to delineate the effects of ICTs from other factors in relation to high performance (Locke, 2004), there is a plethora of studies conducted recently that seem to indicate that the extent of ICTs adoption is indeed correlated with the firms revenues, profitability and other related benefits such as the declining unemployment rate, (Matthews, 2007).

A study conducted by Qiang, Clarke, & Halewood (2006) reveals that enterprises using e-mail for customer communication can grow significantly faster in terms of sales, employment, profitability and productivity than those who do not. Goldstuck (2012) substantiates the findings of Qiang, Clarke, & Halewood (2006) through a survey research conducted under the auspices of World Wide Works which was aimed at evaluating the impact of the Internet and its related applications on South African SMMEs. Goldstuck (2012) indicates that approximately 63% of SMMEs in South Africa have a website. However, more importantly the study reveals that SMMEs with a website have a higher likelihood to be highly profitable compared to SMMEs without one. Goldstuck (2012) further elaborates on the indication that out of the 63% of SMMEs with a website, a third of them would not have survived in business without the use of the website. Other reported website contributions were increasing customer contact, updating of inventory, customer sustainability, business growth, and enhanced competitive advantage in jostling for market share (Goldstuck, 2012). Furthermore, a study by Raymond, Bergeron, & Blili (2005) on manufacturing SMMEs in Canada showed the Internet to be the second-most effective advertising channel, after word-of mouth.

According to Modimogale & Kroeze (2009), there is a huge advantage associated with the use of emerging ICT technologies, particularly Internet connectivity and mobility. The emergence and take up of emerging technologies is also supported by the research conducted by Ismail et al. (2011) who cites that though the response rate was poor at 11%, the research found that emerging technologies such as VoIP are slowly and gradually gaining popularity and there is an intention from SMMEs to understand them better to stand a chance to benefit from them and grow their markets.

The preceding review shows that ICT plays an essential role in the current knowledge based economy, making it vital for SMMEs to join the ICT bandwagon for future sustainability. However, the knowledge-based economy is characterized by increasing demand for more highly skilled workers with a high level of technical expertise (OECD, 1996). Highly skilled workers command higher wages in the market. Thus, SMMEs may not be in a position to afford such type of skilled labor. In addition, the use of ICT requires acquisition of new IT infrastructure which may prove costly for SMMEs in terms of CAPEX (Capital Expenditure) and of OPEX (operational Expenditure). As a result, advanced high-end ICTs (such as cloud computing) that are optimized in terms of CAPEX and OPEX need to be considered by SMMEs.

Defining cloud computing

Cloud computing has been defined in various ways by distinguished research scientists, research industrial organizations, and other related technology analysts. Nevertheless, for the purpose of this study, the National Institute of Standard and Technology (NIST) definition which defines cloud computing as “a model for enabling convenient, on-demand network access to a shared pool of HI configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” is adopted (Dillon, Wu & Chang, 2010).

Service models

According to Hinde & Van Belle (2012) cloud computing currently provides three types of service models namely Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Software as a Service (SaaS). The authors Hinde & Van Belle (2012), Dillon Wu & Chang (2010) & Burloiu (2012) elucidate that SaaS service model refers fundamentally to any fully functional software service or

application distributed through the Internet. This means that cloud consumers can access their applications hosted on a cloud environment by cloud providers through various clients such as a web browser, smart phone and so forth. Examples of SaaS are Google Gmail, Google Docs and Salesforce Customer Relations Management (CRM).

The authors further elaborate that PaaS is distinguished from SaaS in that it provides an enabling environment that permits developers to design, develop, test and deploy web applications or services without the cost or complexity of setting up the hardware and software in-house. Some of the examples of PaaS are Google AppEngine platform and Microsoft Windows Azure platform. In addition to SaaS and PaaS, Hinde & Van Belle (2012), Dillon, Wu & Chang (2010, & Burloiu (2012) explain that there is also IaaS. Infrastructure as a Service (IaaS) refers to providing for the processing, storage, networks and other essential computer resources which allow the consumer to make effective use and run any type of random software such as operating systems or applications. In this scenario cloud services vendors offer a virtual machine (VM) environment allowing control over the operating system, storage, and application deployment. Some of the popular practical applications of IaaS are Amazon S3, SQL Azure, Amazon EC2, Zimory and Elastichots.

Deployment models

In addition to the service models, cloud computing offers four deployment models namely: private cloud, public cloud, community cloud and hybrid cloud. A Private Cloud refers to the scenario whereby the cloud infrastructure is made available for the discretion of the single organization with the infrastructure managed by the organization, a third party or both (Dillon, Wu & Chang, 2010; Burloiu, 2012). One of the examples of private cloud is eBay. In the Public Cloud domain the infrastructure is made available for the use of the general public. This is the most popular and widely used deployment model of cloud computing. Dillon, Wu & Chang, (2010) and Burloiu, (2012) state that in this scenario, the cloud service vendor has the full ownership and management of the infrastructure. Some of the most popular public clouds are offered by Google, Amazon, Rackspace and Microsoft.

According to Dillon, Wu & Chang (2010), Burloiu, (2012) Community Clouds are still in their infancy. It is however still important to understand how they function. In the community cloud mode, several organizations work together to jointly create and share the same cloud infrastructure including policies, requirements, values, and concerns. In this deployment model, the cloud infrastructure could be hosted by a third-party vendor or within one of the organizations in the community. The Hybrid Cloud deployment model is simply a combination of the different deployment models i.e. private cloud, public cloud and community cloud (Dillon, Wu & Chang, 2010; Burloiu, 2012).

A REVIEW OF VALUE PROPOSITION AMONG CLOUD SERVICES VENDORS

This section provides a brief literature review in relation to the status of cloud computing vendors' value proposition to South African SMMEs in relation to cloud computing services.

Definition of Basic Cloud Computing Concepts

According to Goldstuck (2012), SMMEs are slow on the uptake of cloud computing services, and one of the key reasons that adoption has not been more pervasive from this particular industry sector is that many of these companies simply do not understand the concept of cloud computing due to industry terminology shrouding it in jargon. For an example, the use of IT infrastructure such as on demand

virtualized storage is normally known to be IaaS, however, others consider it to be what is known as DaaS (Data storage as a Service) which can be seen as a separate cloud service layer with different connotations or a simple IaaS (Dillon, Wu & Chang, 2010; Leimeister, Riedl, Böhm, & Krcmar, 2010). For MTN (MTN Business, 2013) DaaS means a Desktop as a Service application which is a mixture of SaaS and IaaS. Most cloud vendors do not define and classify services or use the same terminology that is familiar within the cloud computing society, for example, Amazon offers a myriad of cloud computing services without classifying/defining them as SaaS, IaaS or PaaS on a self-provisioning basis. This means that clients/customers need to be IT technically savvy and understand clearly the details of the service offering before they can self-provision a service.

This view is corroborated by Hinde & Van Belle's (2012) study findings which indicate that most SMMEs currently adopting cloud computing fit a unique profile. They are small, are operating within the IT industry, and have business owners who are IT specialists or are technologically proficient enough to drive the cloud adoption process themselves. Thus, the implication is that SMMEs, outside the ITC sector, and very small and micro enterprises which are usually located within the informal sector and have better growth rates and potential for job creation than medium and large enterprises will be detrimentally impacted. Therefore, it seems that there are misunderstandings and misconceptions about some of the concepts and services/applications presented by cloud computing particularly by SMMEs outside the IT and Telecoms sector.

SMMEs perceptions on the most important and valuable cloud services

The top two applications/services considered and perceived to be the most important, valuable and a priority to be moved to the cloud are web hosting, followed by e-mail hosting (Hinde & Van Belle, 2012). Even though web hosting may be considered 'old-school' and mature as it has been offered as a service since the Internet boom in the mid-1990s by brands such as Google, Amazon and Microsoft, it is very critical and plays a significant role in SMME development and growth. The findings of Goldstuck's survey (2012) indicate that SMMEs with a website are far more likely to be highly profitable, while those without a website are already in the red and in danger of making themselves irrelevant to their customers. This is because SMMEs in South Africa that do not have any kind of web presence are losing out on a major channel of potential communication as a result of an ever-increasing number of people searching online for service providers. Thus, for SMMEs a website is a key survival tool as it enables customer interaction and communication, showcases the latest available products, and contributes to company sustainability and business growth; it enables SMMEs to compete on equal footing with equivalent businesses and other related large enterprises.

Although many cloud services vendors are offering website hosting services, Google through AppEngine, Microsoft through Office Live Small Business (Discontinued), Amazon through Amazon S3, Vodacom through Hosting Express, MTN through MTN WebPlus; a plethora of SMMEs are clearly still not perceiving this service as important, valuable and critical to their survival. According to Goldstuck (2012), SMMEs that are clearly fully aware of the importance of a website are the ones in the IT and telecoms sectors. This is simply because IT and telecoms environments are the spaces in which they do business. A common perception and view held by companies who do not perceive a website as important and usually outside the IT and Telecoms sectors is that there are not enough people online to justify a Web presence (Goldstuck, 2012). This is rather concerning as it has been shown in Goldstuck's study (2012) that a critical mass of consumers is already online, and the growth in users is accelerating.

Thus, it seems that there is a clear misconception of the benefits, value and importance of web hosting services particularly by SMMEs outside the IT and Telecoms sector.

Main concerns influencing SMME cloud computing adoption rate

The move towards cloud computing technology is fundamentally based on its business model. The cloud computing business model is based on the delivery of services to end users (individuals, SMMEs and enterprises) on a pay-per-use approach in which guarantees are offered by the cloud vendors by means of customized Service Level Agreements (SLAs), (Neves, Marta, Correia & de Castro Neto, 2011). This makes Cloud Computing attractive due to its pay-per-use business model which fundamentally does away with contracts and lock-in terms. This view is reflected by Hinde & Van Belle (2012) survey studies which indicate that the biggest turnoff for potential cloud computing adopters is the deviation from the pay-per-use model, which is usually the main reason why they would want to adopt cloud computing in the first place.

This turnoff is usually a manifestation of concerns around lock-in terms and contracts associated with the traditional IT infrastructure sourcing model whereby traditional software, is based on annual licensing agreements and software upgrades in cost inefficiencies as a result of high costs. Furthermore, potential cloud adopters are concerned about being kept tied to a particular vendor with terms that are unfavorable. It would seem that potential cloud adopters would like to be sure their data is transferable and that they are free to try before they buy and that they have the flexibility of the pay-per-use model.

Nonetheless, it is evident that there is still some confusion about the pay-per-use model. Many cloud services vendors including (MTN Business, 2014; Vodacom Business, 2014; IS Ignite, 2014; Amazon Web Services, 2014) seems to be opting for prepaid service/subscription plans with contracts and lock-in terms ranging from a minimum of 1 month to 2 years and requiring advance payment. These service plans seem to not be flexible as they are not linked to usage but are based on a fixed price per contract term. For example, a web hosting service from Vodacom (Vodacom Business, 2014) based on 10GB storage is priced at R342 per month fixed rate. This means even if you use it for 1 hour in a day or use it for only 5 days in a month (16% usage) you still pay the full amount.

This problem is exacerbated in long term service plans such as the MTN Baas service which is based on a six months or twelve months contract term, the MTN Daas service plan which includes a one year contract term or the MTN Cloud Security service plan which includes a 2 two year service plan, (MTN Business, 2014). The cost implications of penalties in terms of terminating the contract are substantial for these long term contracts. For instance, Microsoft Online Subscription Agreement states that “for a one year subscription term, if you terminate a subscription at any other time during the contract term, you must pay 25% of the subscription fee otherwise due for the remainder of the one year term” (Microsoft, 2014). It is therefore prevalent that there is some form of deviation from the cloud computing pay-per-use model and this may have implications on the cloud computing value proposition.

Even though it may be argued that most cloud solutions can be considered more secure than what the average SMME has as data protection and security due to the centralization of data and increased security-focused resources in the cloud vendor's data centers, it is evident that potential cloud customers are still reluctant to deploy their business on the cloud (Goldstuck, 2012; Kuyoro, Ibikunle & Awodele, 2011). In fact, according to Kuyoro, Ibikunle & Awodele (2011); Kadam (2011); Jansen (2011); Chen & Zhao (2012) and ITU (2012) security is seen as the biggest obstacle and greatest challenge to cloud

computing adoption. This security challenge is brought about by the openness and the multi-tenant characteristic of the cloud environment.

According to Kadam (2011), Jansen (2011), and Chen & Zhao (2012) consumers have reasons to be concerned and skeptical about cloud computing data privacy and security. This is evident from the myriad of data security breaches that occurred since the emergence of cloud computing. In December 2010, data related to Microsoft Productivity Online Suite was downloaded by unauthorized users. Epsilon was attacked by hackers affecting 2% of its approximately 2,500 clients. Amazon EC2 cloud was hacked resulting in EC2 and Sony corporation PlayStation customer database being affected. In 2009 Google Docs experienced serious leakage of user private information, while in the same year Gmail also experienced a global failure of up to 4 hours. Similar to Google, Microsoft's Azure cloud computing platform also experienced a serious outage accident for about 22 hours. Other companies have even perished due to cloud computing security issues. For example, Linkup, an online storage service company closed down after losing access to a significant amount of data from its 20,000 customers. Thus, there is a plethora of evidence highlighting the seriousness of cloud computing data protection and security challenges.

According to Gartner studies (InfoWorld, 2008), potential cloud customers must review the cloud vendors and cloud computing data security position through evaluation of seven specific key safety issues, namely privileged user access, regulatory compliance, data location, data segregation, recovery, investigative support and long-term viability. In light of this, we have evaluated the security and privacy practices of the six organizations used in this literature study. The review indicates that leading global companies such as Amazon, Google and Microsoft have data privacy and security policies and standards in place and are working with external bodies such as Cloud Security Alliance (CSA) to refine their policies and standards. For example, Amazon AWS is already compliant to Payment Card Industry (PCI) Data Security Standard (DSS) and the International Organization for Standardization (ISO) 27001 global security standard. This may be one of the reasons these organizations are highly rated in terms of credibility as cloud computing service providers. This is reflected by their growing subscriber base.

On the other hand in South Africa and the rest of Africa, cloud vendors do not seem to give emphasis to the security aspect of cloud computing. For example, Vodacom's data privacy policy states that "Vodacom makes no guarantee regarding, and assume no liability for, the security and integrity of any data or information a User transmits via the Service or over the Internet, including any data or information transmitted via any server designated as "secure"" (Vodacom, 2014). It also seems that companies are not moving swiftly to associate themselves with standardization, certification and compliance bodies in terms of data privacy and security. It is therefore imperative that to improve SMME adoption rate, there are still some major concerns that need to be addressed.

This research was therefore intended to explore the value proposition of cloud computing vendors to South African SMMEs in relation to cloud computing technology and its associated services. The research was carried out as detailed in the next section.

RESEARCH METHODOLOGY

Participants

In this research study the unit of analysis was entrepreneurs, managers and decision makers in the SMMEs within the City of Tshwane Metropolitan Municipality (CTMM). The target population was

SMMEs within the CTMM region and largely based on Mabopane, Mamelodi, Soshanguve, Ga-Rankuwa, Eersterust, Atteridgeville, Winterveld, Silverton, Pretoria Central Business District (CBD) and Rosslyn as the target areas. Non-probability convenience sampling was used for this study because of financial and time constraints, and the unstructured nature of the research population. Data was collected from a sample of 100 SMMEs through an e-mail survey based on a structured questionnaire.

Instrument

The research approach and methodology of this study was fundamentally explanatory and descriptive in nature. The research approach was explanatory as it examined the factors that influenced the SMME perceived value proposition to scrutinize the actual value proposition from cloud vendors. According to Nenzhelele (2012) descriptive researches are quantitative in nature and in general make use of personal interviews, mall intercepts, telephone interviews, mail surveys, facsimile surveys, panels, web-based surveys, e-mail surveys and online panels. In order to meet its objectives, this research study was comprised of two basic components as part of the research methodology, (1) literature review as the secondary source of research data and (2) quantitative research conducted through an e-mail survey as the primary source of research data.

The main sources of primary data was a structured questionnaire with mainly closed-ended questions and a few open-ended questions, while the secondary data were articles, books, press reports, websites, dissertations and theses.

For the secondary data, the study involved a literature survey to have an understanding of the current status of SMMEs in South Africa, ICTs and how they relate to SMMEs, the cloud computing concept and how it relates to SMMEs. Content analysis was used to review the current offerings from some of the common and leading cloud services vendors; it was mainly done through the study of offerings presented on the cloud computing vendors' websites.

For data analysis each completed questionnaire was scrutinized to establish the acceptability of the data. The received questionnaires were numerically coded for ease of data analysis. Thereafter, the data was captured onto a Microsoft Excel spreadsheet and exported to the Statistical Package for Social Sciences (SPSS) to produce tables. The descriptive statistics focused on points of central tendency, measures of variability and measures of association statistics for the analysis of the variables in this research study.

Since in this study a questionnaire was used to collect data from the participants, it was important to evaluate the validity of this measuring instrument. In order to improve this measuring instrument, a pilot study was conducted amongst several end users including research experts, friends and colleagues to determine its validity. For reliability, the Cronbach's coefficient alpha analysis was used in this research study to test the reliability of the measurement instrument. The internal data reliability (Cronbach' Alpha) was calculated to be 0.946. This indicated that the measurement instrument had significantly high levels of reliability.

It is the researcher's responsibility to ensure that the research that is undertaken is ethically acceptable. To guarantee that the study was conducted in an ethically acceptable manner, the researcher endeavored to not expose research participants to unnecessary physical or psychological harm, ensured that an informed consent letter was formulated and sent to participants to ensure that they were adequately informed about the nature of the study. The participant's participation was kept confidential to ensure that their right of privacy is protected and that the study was conducted with honesty and professionalism.

FINDINGS AND DISCUSSION

Demographic profile of the survey respondents

Most of the respondents were males accounting for 73% of the respondents i.e. 22 out of 30 respondents were males. The ages of the respondents however varied, even though the age group of over 40 years old dominated. This age group of 41-50 years old accounted for 60% of the respondents. The youth group (20-39 years old) accounted for the remaining 40%. Most of the respondents were owners (46.7%) of micro (40%) and very small (20%) businesses with adequate levels of education. A higher percentage (96.7%) of the respondents had a post-matric qualification, namely a bachelor's degree (40%), honors degree (10%), a postgraduate degree such as a master's degree (20%), or a diploma (26.7%). In summary, the respondents were male owners of micro and very small businesses who were over the age of 40 years old and were adequately educated.

Understanding of Cloud Computing Basics

To establish SMMEs' understanding of cloud computing basics concepts, respondents were asked to rate their familiarity with the basic cloud computing terms and concepts using a five-point Likert scale with 1 = "Fully familiar", 2 = "Fairly familiar", 3 = "Vaguely familiar", 4 = "Heard of but don't know what it is" and 5 = "Never heard of it". Table 1 shows the different variables that were used to help in establishing the respondents' understanding of cloud computing basic concepts.

Table 1 indicate that the variables SaaS, IaaS, PaaS, DaaS, CaaS and Hybrid cloud seems to revolve around the response (Heard of but don't know what it is). This implies that most of the respondents do not understand these terms with CaaS being the most unknown term. Furthermore, Table 1 also shows that the variables Public cloud, Community cloud and Private cloud seems to revolve around the response (Vaguely familiar). This implies that most of the respondents were somewhat unclear about whether they understood these terms or not. Public cloud was the most unclear term to respondents. It is also illustrated in Table 1 that the variables Cloud computing services, Managed services, Outsourced services and Hosted services seems to revolve around the response (Fully and fairly familiar). This implies that most of the respondents were familiar with these terms with Outsourced services being the most familiar term to the respondents.

Cloud Computing Basics			
Variable	Question	Mean	Standard Deviation
CaaS	How well do you understand the term CaaS?	4.20	1.215
PaaS	How well do you understand the term PaaS?	4.03	1.273
IaaS	How well do you understand the term IaaS?	3.87	1.479
DaaS	How well do you understand the term DaaS?	3.87	1.592
SaaS	How well do you understand the term SaaS?	3.57	1.612
Hybrid Cloud	How well do you understand the term Hybrid Cloud?	3.63	1.474
Public Cloud	How well do you understand the term Public Cloud?	3.17	1.392
Community	How well do you understand the term	3.13	1.525

Cloud	Community Cloud?		
Private Cloud	How well do you understand the term Private Cloud?	3.03	1.450
Cloud Computing Services	How well do you understand the term Cloud Computing Services?	2.67	1.561
Hosted Services	How well do you understand the term Hosted Services?	2.33	1.241
Managed Services	How well do you understand the term Managed Services?	2.17	1.315
Outsourced Services	How well do you understand the term Outsourced Services?	1.30	0.535

Table 1. Understanding of Cloud Computing basics terms and concept

Applications/services perceived by SMMEs as most important and valuable to move to the cloud

To establish the applications that are perceived by SMMEs as most important and valuable to move to the cloud, five applications were identified as the most prevalently used in businesses as shown in Figure 1. Most of the respondents (64%) indicated that web hosting is the most important and valuable application to outsource to the cloud. However, 43.3% of respondents also indicated that they did not have a website as it were. The respondents pointed out that one of the major reasons why they do not have a website site is because it is too expensive to acquire or maintain.

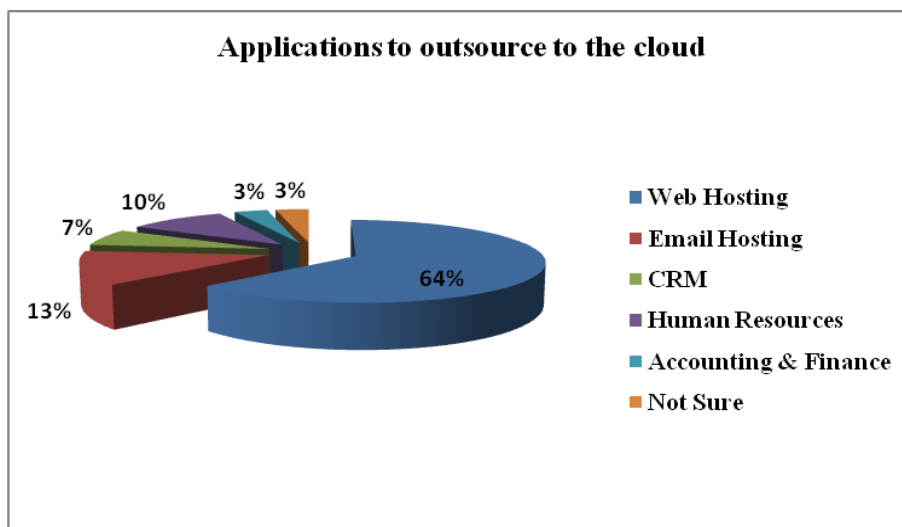


Figure 1. Applications perceived as most important and valuable to outsource to the cloud by SMMEs

SMME's Main Concerns in Adopting Cloud Computing

To establish SMME's main concerns in adopting cloud computing, respondents were asked to rate the significance of the perceived cloud barriers indicated in Table 2 in relation to cloud vendors services providers using a three-point Likert scale with 1 = "Not significant", 2 = "Medium significance", and 3 = "Very significant". Table 2 shows the different variables that were used to help in establishing the main concerns of SMMEs when adopting cloud computing.

Table 2 indicates that most of the respondents' responses in relation to the variables from recovery of data to unclear scheme in pay-per-use model seem to revolve around the response "Very Significant". This implies that most of the respondents do consider recovery of data, connectivity issues, data privacy and security, application performance, integration issues with other applications, complex, pricing/charging model, lock-in terms and contracts, poor service level agreements, customization of the product, unclear scheme in pay per use model as very significant and as have major concerns in adopting cloud computing. It is also shown in Table 2 that recovery of data is the most significant main concern when adopting cloud computing from the perspective of the respondents.

Main Concerns in Adopting Cloud Computing		
Variable	Mean	Standard Deviation
Recovery of Data	3.00	0.263
Connectivity Issues	3.00	0.371
Data Privacy and Security	2.87	0.434
Application Performance	2.83	0.461
Integration Issues with other Applications	2.77	0.504
Complex Pricing/Charging Model	2.77	0.568
Lock-in Terms and Contracts	2.67	0.711
Poor Service Level Agreements	2.60	0.724
Customization of the Product	2.60	0.675
Unclear Scheme in Pay Per Use Model	2.53	0.973

Table 2. SMME main concerns when adopting Cloud Computing

DISCUSSION

The findings of this study reveal that SMMEs do not understand the basic key terms and concept of cloud computing. This is evidenced from the majority of the respondents' responses which indicate that they do not understand the basic cloud computing service models (SaaS, IaaS, PaaS, DaaS and CaaS) and the basic cloud computing deployment models (Public cloud, Private cloud, Community cloud and Hybrid cloud). Thus, these findings are consistent with the findings of Goldstuck (2012) and Hinde & Van Belle (2012) who indicates that most of the SMMEs simply do not understand the concept of cloud computing due to industry terminology shrouding it in jargon and SMMEs that are currently adopting

cloud computing fit a unique profile. They are small, are operating within the IT industry, and have business owners who are IT specialists or are technologically proficient enough to drive the cloud adoption process themselves.

The study findings also reveal that although web hosting is considered by SMMEs as the most important application to outsource to the cloud, a significant number of the SMMEs are still without a website. One of the leading reasons put forward by the SMMEs is that it is too expensive to have a website site. This is a concerning issue since web hosting can cost as little as R35 per month for a simple web hosting package (IS Ignite, 2013). It seems therefore that the value proposition of web hosting in relation to SMMEs is not properly and clearly communicated to SMMEs. This may be because the cloud services vendors are focusing on the high end new services such as the MTN's hosted PBX, Vodacom's One Net Express and Google's compute engine, and are overlooking web hosting which may be considered 'old-school' and mature to be of any significant value.

Furthermore, the findings of this study reveal that SMMEs do consider contract lock-in terms, data privacy and security and deviation from pay per use model as very significant barriers and main concerns to cloud computing adoption. Thus, these findings are consistent with the findings of Goldstuck (2012), Hinde & Van Belle (2012), Kuyoro, Ibikunle & Awodele; (2011), Kadam, Y. (2011), Jansen (2011), Chen & Zhao (2012), and ITU (2012). It would seem that there is no concerted effort and focus on data privacy and security measures, and the cloud services vendors have deviated from the pay-per-use model and are offering service plans based on contract lock-ins terms which is the opposite of what cloud computing is intended to do.

CONCLUSION

This study demonstrated that SMMEs are the most pragmatic solution to the two most pressing problems South Africa is facing today namely severely declining economic growth and a high rate of unemployment. However, SMMEs are finding it difficult to remain sustainable to survive today's market environment, which is highly competitive and characterized by a declining economic growth. Cloud computing has recently emerged as a viable solution and an excellent value proposition to SMMEs, as it promises cost efficiencies for SMMEs through its unique business model that is based on the outsourcing of physical IT assets. Cloud computing is changing the entire ICT environment. It presents opportunities for SMMEs to reduce their ICT infrastructure costs through adoption of high-end information and communication systems.

Even though there is a plethora of significant benefits presented by cloud computing to SMMEs, the current adoption rate is significantly low. As a result, the objectives of this research study were to establish the extent to which South African SMMEs comprehend cloud computing concepts including key terms; to identify cloud computing applications/services that are most valuable and critical to the growth and development of South African SMMEs, and to identify the main concerns influencing MMEs not to adopt cloud computing.

The findings of this study reveal that SMMEs do not understand the basic key terms and concept of cloud computing. They do not understand the fundamental building blocks of cloud computing such as the applicable service models (SaaS, IaaS and PaaS) and deployment models (Public cloud, Private cloud, Community cloud and Hybrid cloud). The findings of the study also revealed that SMMEs do not understand or are not clear about the benefits of cloud computing. This is perceived as it would be very

challenging to perceive the benefits of cloud computing without comprehending the basic tenet and or building blocks upon which cloud computing is fundamentally based.

It is therefore evident from the study that the value proposition of cloud computing as offered not only by cloud services vendors but also industry experts, consultants and researchers is not clearly or properly perceived by SMMEs in South Africa.

The study was largely limited to the CTMM SMMEs within the Gauteng province, the response rate was 30% out of a target sample size of 100 and a non-probability sampling technique known as convenience sampling was used in this study. Thus, it is recommended that these limitations be taken into consideration when interpreting the results of the study for future research.

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