KEY FACTORS INFLUENCING THE ADOPTION OF CLOUD COMPUTING IN THE SMALL AND MEDIUM ENTERPRISE (SME) SECTOR: A CASE OF SOUTH AFRICA

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ABSTRACT

The arrival of cloud computing has created a drastic change in the way that businesses the world over facilitate their IT resources. However, the adoption rate of cloud computing in the South African SME sector is seen to be slow when compared with other developing countries. This study aims to identify the main factors that impact the rate of adoption of cloud computing in the SME sector by means of a literature review together with a qualitative study of 10 South African SMEs. The study reveals that the key factors influencing adoption of Cloud Computing within the SME sector are both technical and people orientated, with particular focus on available ICT infrastructure and education and training.

Keywords – Cloud Computing, SME, Information System Adoption

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BACKGROUND

The Small and Medium-sized Enterprises (SME) sector is seen as a key in fluencer on developing economies and plays a pivotal role in the reduction of poverty while allowing for job creation (Colin & Andre 2002). Governments from across the world have acknowledged that SMEs have a significant effect on a country's rate of employment, the improvement of standards of living, and the overall impact on a country's economy (Neves et al. 2011). In South Africa, the SME sector accounts for more than 91% of formal business entities contributing on average 54.5% of gross domestic product and providing 61% of the total employment of the economy (Abor & Quartey 2010).

Cloud computing is a relatively new concept in South Africa and represents a paradigm shift in the way IT infrastructure has been supported and procured in recent times (Neves et al. 2011). Before the arrival of invest significantly in their IT infrastructure; large amounts of money would need to be spent implementing server hardware and software in server rooms with various other IT related equipment (Kshetri 2011). The use of Cloud Computing allows an organisation to reduce costs of physical hardware as well as employee headcount required for support, cost reductions that are essential for an SME to remain competitive (Mohlameane and Ruxwana, 2014).

However, the adoption and use of cloud computing in the SME sector in South Africa is seen as not being as rapid as other developing countries (Mohlameane & Ruxwana, 2014; IT Web, 2011; van Zyl, 2014; McDermott, 2014). According to Dimension Data, China (36%) has the highest adoption rate of the BRICSS (Brazil, Russia, India, China, South Korea, and South Africa) nations. China is followed by South Korea (29%), India (16%), Brazil (13%), and Russia (4%) with South Africa last with 3% (Moyo 2013).

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PERCEIVED BENEFITS OF CLOUD COMPUTING

The emergence of cloud computing has presented a new way in which businesses can facilitate their business processes. However, there are many SMEs who are extremely cautious of the idea of storing and hosting their core line of business data and applications in the cloud (Mohlameane & Ruxwana 2013). The following benefits were identified from current literature.

BETTER BUSINESS AGILITY

Cloud computing allows businesses to access their data and software via their web browser regardless of their location (Behrend et al. 2011).

COST SAVINGS

Cloud removes the need for any heavy capital outlay as SMEs don't need to spend money on hardware, software or license fees, as this is taken care of by the cloud service provider (Dachyar & Prasetya 2012; Daiva & Zalieckaite 2012). The need to employ expensive IT support staff is also no longer required, due to many cloud service providers covering all application support requirements (Dachyar & Prasetya 2012; Daiva & Zalieckaite 2012).

LATEST TECHNOLOGY

Patch management and system upgrades can now occur in the cloud with minimal interruptions to service as well as SMEs no longer need to be concerned with their software becoming obsolete as they will be operating on the latest release at all times (Sabahi 2011).

PAY-AS-YOU-GO APPROACH

Since cloud is available on a subscription basis, SMEs can get access to a powerful software solution at a fraction of the cost implying that having to purchase expensive software or developing in-house systems will no longer be required (Sarga 2012; Klems et al. 2009).

QUICK IMPLEMENTATION

As there is no physical hardware and software to purchase, systems can being up and running in the time it takes to enter the organisation's details and payment information (Mohlameane & Ruxwana 2014).

SECURITY

Cloud service providers have to ensure that their service offerings are secure at all times and that their data is encrypted and backed u in order to remain reputable (Kshetri 2011).

ENVIRONMENTALLY FRIENDLIER

Cloud is known to reduce a company's carbon footprint and can result in the use of less paper (Sarga 2012; Alkhalil 2013).

DISASTER RECOVERY

Many SMEs are concerned about what happens to their data if the service crashes. Research has shown that the recovery time of cloud users is shorter than that of other conventional users (Alkhalil 2013).

STREAMLINED WORK ENVIRONMENT COST SAVINGS

Cloud enables companies to streamline their business processes in ways which were not previously possible. By having their data stored in one place, the ability to enable staff collaboration has never been easier (Garrison et al. 2012; Strickland Jr et al. 2010).

EMPOWERMENT OF STAFF

Due to the web nature of cloud services, employees are able to login and use the cloud service at any time. This puts the staff member in complete control, resulting in a greater motivation to perform their job function, which in turn is likely to result in increased productivity (Neves et al. 2011).

Overall, cloud enables SMEs to be more agile, more flexible and more productive while reducing costs and their respective impacts on the environment (Nkomo & Ngambi 2009; Vouk 2008).

FACTORS IDENTIFIED FROM LITERATURE IMPACTING CLOUD ADOPTION

It was predicted in 2010 that the global cloud market would be expected to grow from $37.8 billion in 2010 to $121 billion by 2015 (Marketsandmarkets 2010). According to Gartner, the use of cloud computing is growing so rapidly that their findings indicate that by 2016 the bulk of all new IT spend will be for cloud computing (Gartner, 2013).

However, several factors have been identified that have an impact on the implementation of cloud computing in organisations.

SECURITY

While Kourik (2011) states that the security associated with cloud is a benefit, Abdollahzadehgan (2013) argues that security concerns is a reason to avoid the adoption of cloud all together. Dillon (2010) proposes that security has been the biggest roadblock in the adoption of cloud to date. Storing an organisation's data and running their infrastructure on someone else's hardware can be unnerving to many as Cloud Service Providers (CSP) are potential targets for hackers (Kshetri, 2010). The information stored and hosted by the CSP can be seen as a potential goldmine for cyber criminals. Nkhoma & Dang 2013). One common concern is regarding the ownership and control of a company's data once it resides on a CSP's infrastructure (Kourik 2011). Once the consumer (or SME in this case) is no longer in possession of the data, the confidentiality and integrity of the data is at risk. Once the data is stored on the CSP's infrastructure it would conceivably be a possible for the CSP to tamper with the information virtually undetected According to Kourik (2011) for CSPs the issue of security is of utmost importance and findings indicate that cloud service providers are more likely to employ security and assurance specialists, unlike many SMEs.

When an SME decides to move their data to the cloud, their data will go through two changes. The first change involves the data being stored away from the local machine of the SME. The second change involves the data moving from a single-tenant environment to a multi-tenant environment. These changes lead to the concern of having sensitive data leaked (Sabahi 2011). Another risk that must be taken into consideration is that of computer hackers. Cloud service providers are ideal targets for hackers. Kim et al.(2009) states that cloud technology is not any less secure than on-site solutions. Accordingly, there is no reason why the best security practises that have been adopted for on-site solutions cannot be adopted for cloud solutions (Kim et al. 2009).

AVAILABILITY AND RELIABILITY

Two of the most important characteristics of cloud computing is its reliability and availability, with a loss of service severely impacting a SMEs business, which could result in the loss of customers and revenue (Nkhoma & Dang 2013). Kim et al. (2009) states that a loss of service is unavoidable and SMEs should take

This factor into consideration before choosing to adopt The accessibility of an organisations cloud solution at any given time is an important aspect to take into consideration and scenarios where there is a failure to connect needs to be considered by local SMEs (Fields et al. 2014; Veigas et al. 2011).

PERFORMANCE AND BANDWIDTH

One of the main problems relating to performance can arise from the connection quality between the consumer and the cloud service provider. This is further impacted when more consumers on the same network segment are accessing large amounts of data at the same time (Kim et al. 2009). The further the distance the consumer is physically from the cloud service provider, the higher the chance of that consumer experiencing latency.

The ability to change cloud service providers could be a problem - especially if bandwidth is an issue. A company would need to download all their data they have stored in the cloud and upload it to another cloud vendor's infrastructure and certain providers store the data in a format that makes it almost impossible to extract the data without losing some of the data's format (Alkhalil 2013; Weiss 2007; Dillon et al. 2010).

SMEs may save on capital expenditure in terms of hardware and software, but with cloud computing this could be at the cost of high network-bandwidth charges from their service providers (Leavitt 2009). Organizations often discover that they need to substantially increase their communication band width after adopting cloud technology (Kim et al. 2009). As such, if there is a large amount of data that needs to be transferred to and from the cloud over a slow connection, cloud might not be a viable option for SMEs nor large corporates in South Africa (Misra & Mondal 2011; Greengard 2010; Garrison et al. 2012).

LEGAL COMPLIANCE AND PHYSICAL LOCATION

Veigas et al. (2010) states that where a SMEs data is physically stored and where the transactions take place could raise a host of tax and legal compliancy issues (Veigas et al., 2010). Before SMEs and other corporate bodies move their data to the cloud, they would need to determine the sensitivity of that data and whether or not the CPS's data storage location is secure enough for that data to reside. SMEs cannot ignore this factor if they are placing sensitive data into the cloud (Armbrust et al. 2009; Obeidat & Turgay 2012).

Legal compliance and physical location of where data resides in the cloud is a fair concern for SMEs, and this factor could be the biggest deterrent for adopting cloud computing at a local, national and international level (Marston et al. 2011; Kim et al. 2009).

LIMITED KNOWLEDGE OF CLOUD COMPUTING

Due to the owner in most cases being the key decision maker in a business, their knowledge of IT is a huge determining factor on what type of technology a company adopts (Fink 1998). Kourik (2011) and Mohlameane and Ruxwana (2014) share the same opinion that SME owners often lack the knowledge, understanding or awareness of cloud computing and this lack of knowledge is a barrier to the adoption of cloud computing.

RESEARCH METHODOLOGY

The study began with an intensive literature review in order to understand what factors have been identified in current literature. This was followed by one-on-one interviews with SME IT senior staff and/or decision makers in South African organisation not all SMEs

have dedicated IT departments and technology decisions are often made by the owner or financial manager of the SME (Fink 1998). The Technology Acceptance Model (TAM) was used as the basis for the interview questions developed (Davis, 1989).

A semi-structured interview approach was followed, with open ended questions gaving the interviewee's the opportunity to express their feelings and views very openly without many restrictions. The questions were divided into the following four different sections, namely:

- Demographics
- ICT in business
- Current infrastructure,
- Cloud computing

The literature review and the Technology Acceptance Model (TAM) was used as the bases for all the Questions in the interview, while keeping the goal of addressing the main research question as well as all the secondary research questions.

Each interview that was conducted lasted an average of 30 minutes. Each interview was conducted at the interviewee's respective place of business and all interviews conducted were of a face to face nature. At the start of each interview, the interviewee was briefed on the nature of the interview and was given a definition of ICT. The interviewees were not given a definition of cloud computing so as to not impact or sway their perceptions of what cloud computing may or may not be. The questions were focused around their perception of ICT in general as well as the perception of cloud computing from their respective standpoints.

IMPLICATIONS AND CONCLUSION

The SMEs who participated in this study perceived bandwidth unavailability to be the most inhibiting factor. Respondents believe they are currently paying too much for bandwidth that it is unreliable. The other two key factors which were perceived to be of major concerns by the SMEs were performance and availability which are tied in with availability of bandwidth. It is believed that with cloud computing will only be seen as a viable option for SMEs once proper infrastructure is in place.

The SMEs were also found to have a limited knowledge of cloud computing. They understand the basics but do not understand the intricacies of cloud computing. This can be attributed to SMEs not having the correct people making technology decisions for their respective companies as mentioned above.

SMEs who participated in this study were not optimistic and were not interested in finding out more information about cloud. It was found that until SMEs perceptions change with regards to cloud computing and the factors that affect it, South Africa cannot expect an increase in the rate of cloud adoption by SMEs. This could be done via government intervention and educational programs targeted at SMEs.

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