CONCEPTUALIZING A MODEL FOR CLOUD COMPUTING ADOPTION BY SMEs

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Abstract

Cloud computing is recognized as an emerging paradigm in today's business environment. Nevertheless, it is not completely a new technology, it is widespread due to the fast development of the internet, mobile phones, higher bandwidth and increasing mobility requirements of the clients. In spite of the fact that the adoption of cloud computing services is proliferating in large companies, SMEs still reluctant to employ cloud computing services due to their lack of knowledge and a clear guideline in this area. This study intends to address this SMEs problem in adopting the cloud computing technology and highlight the potential of cloud computing technology for SMEs in today's competitive market. In this regard, various dimensions of this technology are emphasized and the serious challenges that are hindering the adoption of cloud computing in SMEs are highlighted in this research. Despite the existing concerns in adopting cloud computing in SMEs, its commercial viability and the easy pay-as-you-go cost system, especially in the existing economic complexities are discussed in details. To evaluate the determinants of cloud computing adoption in SMEs, a research model is developed according to the technology-organization-environment (TOE) framework and diffusion of innovation (DOI) theory.

Keywords: Technology adoption, cloud computing adoption; SMEs; adoption models; TOE; DOI.

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1. Introduction

Many organizations encounter difficulties in acquiring and maintaining the vast Information Technology (IT) infrastructure needed for their effective business operations. Some of these organizations are in public and private sectors, such as schools, hospitals, retailers, and government agencies. The organizations experience difficulties mainly in acquiring, hosting, maintaining, and supporting the required information technology systems, applications, and infrastructure that drive the alignment of their IT objectives with business objectives that leads to efficient business operations (Belalem et al., 2011). These difficulties in the acquisition and maintenance pose greater challenges, especially for small and medium enterprises (SMEs), preventing them from taking advantage of the huge computational powers which their counterparts in large organizations enjoy (Low et al., 2011). Belalem et al. (2011) pointed out that the difficulty in infrastructure acquisition and maintenance in turn causes loss of substantial amounts of revenue to those organizations. As a result, some organizations resort to the implementation of emerging new computing technologies, such as cloud computing, in processing business information. Despite the efforts of some organizations in embracing cloud technology, the utilization is still limited (Aboelmaged, 2010, Alshamaila et al., 2013, Buyya et al., 2009, Gangwar et al., 2015, Gosciniski and Brock, 2010, Low et al., 2011, Rath et al., 2012, Raza et al., 2015, Tarmidi et al., 2014, Zhang et al., 2010). On the other hand, many organizations still feel reluctant in embracing such new and emerging technology due to a variety of concerns, such as security, privacy, data integrity, and data confidentiality that are considered as major issues in cloud computing domain (Lee et al., 2013, Yigitbasioglu et al., 2015). Previous researches had attempted to address these problems; however, in cloud computing, there has been inadequate research to answer the question of predicting adoption of the technology by organizations (Aboelmaged, 2010).

There is a lack of clear industry guidelines on the definition of Private Clouds (Frost and Sullivan, 2012, Grossman et al., 2009, Lin and Chen, 2012). Most of the clients are trying to comprehend the private and public cloud differences and differentiate between virtualized infrastructure and private cloud. In this regard, this ambiguity probably remains in the short period due to this lack of clear understanding and also the absence of suitable metrics on asset ownership and measurement of the usage (Frost and Sullivan, 2012). Moreover, many relevant issues in the domain of cloud technology research are still in developmental stages. Although cloud computing technology was introduced around the year 2000, research in the field has only recently gained momentum (Bayramusta and Nasir, 2016, Wang et al., 2016). Since scientific studies on the adoption of cloud technology is still scarce, meaningful scales to measure the constructs used in cloud adoption are generally considered inadequate and not well developed (Divya and Kuppusamy, 2015, Ekufu and Adviser-Livingood, 2012). Consequently, the main aim of this study is to examine the impacts of different cloud computing determinants in the SMEs cloud computing adoption in terms of the capability of SMEs leaders to make a conscious and critical decision to the business in a competitive market.

2. Theoretical and conceptual Background

Despite the fact that cloud computing technology has been argued as a modern technology development which is able to offer several benefits to the adopters either in terms of strategic or operational aspect, the adoption rate of cloud computing is not increasing as rapidly as anticipated (Banerjee, 2010, Buyya et al., 2009, Gangwar et al., 2015, Gosciniski and Brock, 2010, Raza et al., 2015). In another study, Truong (2009) reported that a limited type of emerging cloud computing technology has been used by less than 2% of small businesses and the necessity of understanding the considerable potential of cloud computing services for small businesses has been acknowledged. Modeling cloud-computing business macroeconomics, Etro (2009) predicted increased economic contribution of small businesses through simulating something in the region of 430,000 company creations in the period of 5 years employing a high adoption rate of cloud computing, that was 5 times more than the number of company creations employing a low adoption rate of cloud computing. Cloud computing services provide cost effectiveness, flexibility, configurability, low implementation cost to IT sector. Many practitioners and scholars have presented numerous advantages that an enterprise able to obtain if they adapt themselves to this new technology (Alshamaila et al., 2013, Durowoju et al., 2011, Lin and Chen, 2012, Wang and He, 2014).

According to the literature, some SMEs still reluctant to adopt cloud computing due to the lack of a clear guideline and acceptable standard. Moreover, The SMEs lack of understanding of the cloud computing concept has affected their cloud computing adoption rate (Aboelmaged, 2010, Doherty et al., 2015, Gupta et al., 2013, Sultan, 2011, Tarmidi et al., 2014, Trigueros-Preciado et al., 2013). This in turn limits SMEs to recognize the considerable
advantages of cloud computing for their own businesses. If small businesses do not accept cloud computing technology, they lose its benefits and the competitive advantage that the technology could give to them. It might then threaten the small businesses’ sustainability and economic contribution. In the SMEs sector, the low levels of knowledge in cloud computing could be considered as one of the main obstacles of adoption of cloud computing within SMEs (Adam and Musah, 2015, Tarmidi et al., 2014, Tehrani and Shirazi, 2014, Trigueros-Preciado et al., 2013). This issue is creating a gap between the cloud computing technological development and its employment by the enterprises, which miss opportunities due to not taking the advantage of novel advances. The aim of this research is to explore most influential elements in adoption of cloud computing among SMEs. Cloud Computing provides new services, specially for SMEs, due to the fact that access to resources is equal to those of large companies. Therefore, this study place an emphasis on the cloud computing adoption in SMEs.

3. Proposed research model and hypotheses

It is crucial for any enterprise to realize that cloud computing adoption is not just a technical matter, but is also an organizational issue which consist of users, costs, and organizational matters (Khajeh-Hosseini et al., 2010; Marston et al., 2011). Accordingly, it is more suitable in evaluating a cloud adoption project to consider beyond the technical facets. Current studies such as Service Level Agreement is not totally associated with the risk analysis and return status in the enterprise that adopt cloud computing. Other research model exists which intend to bridge the gap between the business and technical aspects and try to employ recognized economic models for adoption of cloud computing (Chang et al., 2016). There are many studies which put emphasis on models that merge two or more theoretical framework to explore the adoption of novel innovative technologies in IT domain (Oliveira and Martins, 2011, Wu et al., 2013). In order to fully realize the decisions regarding the technological innovation adoption, a comprehensive scope of study is required and the specific variables need to be considered according to innovation features. TOE and DOI frameworks have been employed extensively in IT adoption sector, and have faced continues empirical support. In different ways, these two different models overlap with their identified innovation features (Rogers, 2003). Accordingly, the advantage of combining the TOE contexts to develop the DOI theory is well recognized (Oliveira and Martins, 2011, Wu et al., 2013). The technology aspect is clearly same as the characteristics specified by Rogers (2003). The external and internal organizational features of DOI theory are same as identified organization context in TOE framework. Additionally, significant differences exist between the two theories. The individual features such as top management support is not defined by TOE framework. In this regard, DOI theory recommended to consider the top management support among organizational factors. Furthermore, DOI theory does not include the various effects of environmental aspect. Since DOI theory lacking some crucial features, the TOE framework is able to provide an extensive perspective to fully comprehend IT adoption through considering three different contexts, technology; organization; and environment. Therefore, these two theories complement each other implicitly (Oliveira and Martins, 2011).

To sum up, according to our literature content analysis and several expert judgments in the area of cloud computing technology, the research framework of this study is presented in Figure 1. In order to specify the constructs of the combined research model, we applied the TOE framework and DOI theory as the basis of our study. In addition, we categorized the high-cited studies to identify the most important factors highlighted in the literature of SMEs IT adoption. Lastly, we evaluated all construct to explore its applicability in adoption of cloud computing in SMEs.
Figure 1. Proposed Research Framework for Cloud Computing Adoption in SMEs
4. Conclusion

Findings of this research have significant implications and considerable value for scholars, top managers, and IT service providers, to devise better strategies for adoption of cloud computing in SMEs. Applying the proposed model in this research can help service providers to enhance their knowledge about SMEs and their various decisions regarding the adoption of cloud computing while they are working in a same market. However, on the other hand, cloud providers may need to enhance their cooperation with SMEs who are interested to cloud computing technology, in order to provide a great environment for adoption of cloud computing, and also eliminating any ambiguity in the adoption of this novel technology. To sum up, based on the literature and the conducted interviews, most of the companies in SMEs sector have a fragmented understanding of the cloud computing services and the lack of cloud knowledge has limited their migration to the cloud. Additionally, they have a strong wait and see attitude toward cloud computing adoption. Too many legacy applications are not cloud ready while there is considerable enthusiasm for adopting the cloud computing. Moreover, security and privacy concerns are among the main challenges of cloud computing adoption that SMEs face today same as all other organizations all over the world. On the other hand, Malaysia is the second largest cloud computing market in the ASEAN region and cloud computing is becoming an integral part of the organizational IT strategy in the Malaysian market. Besides the government sectors, there are three other major sectors in Malaysia that have shown increasing interest on cloud solutions, namely manufacturing/hi-tech industrial, healthcare and retail, and SMEs. In addition, Malaysian enterprises are looking for low and flexible price points with high security and privacy guarantees from service providers before migrating to the cloud. Consequently, the apparent lack of a clear and concise guideline is identified as the main obstacle for adopting cloud computing in organizations. This study intends to shed light on this problem by specifying the most significant determinants of cloud computing adoption and exploring their difference impacts in Malaysian SMEs. The results of this study can help the IT managers and decision makers in the organization to efficiently monitor the current situation of their organization and make a conscious decision in migrating to the cloud computing.

References


