

## Innovation characteristics and the decision to adopt cloud computing by Small and Medium Enterprises in Kampala

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### Abstract

The study looked at the innovation traits that influenced SME (Small and Medium enterprises) adoption of cloud computing in Kampala, Uganda.

In Kampala, Uganda, Small and Medium Enterprises (SMEs) made decisions to use cloud computing based on innovation characteristics.

It was found out that: cloud computing enhanced innovations in their business (Mean = 3.78, St. Dev = .601), there was a complexity that comes with the use of cloud computing (Mean = 4.01, St. Dev = 1.180), cloud could not be easily be integrated into our existing IT infrastructure (Mean = 2.62, St. Dev = 1.032), there was Trialability (Trialability is the ease with which customers can try a new product or service) of the cloud computing systems was conducive in this business (Mean = 3.40, St. Dev = .921), there was no security (Mean = 2.73, St. Dev = .918), lack of privacy (Mean = 2.71, St. Dev = .790).

**Keywords:** innovation characteristics, cloud computing, SMEs

### Introduction

Businesses are perceived as benefiting from cloud computing since it enables them to execute activities more quickly and cheaply. It offers extensive shared Internet-based IT infrastructure (Vidhyalakshmi, 2012).

Despite the advantages, businesses are still hesitant to use cloud computing technology and services because they continue to shop around for software and hardware that, in most cases, does not fulfill their operational needs (Fishman 2012; Luftman & Ben-Zvi 2010).

According to Mugenyi, limited resources such as financial inadequacy, process servers, and very low memory saves, storage, and bandwidth are among the primary barriers to cloud computing adoption in Uganda (2018).

Despite the numerous benefits associated with cloud computing, the use of cloud computing by SMEs in Uganda is generally low and not growing as quickly as one would expect (Namisango et al., 2014). Several factors have been cited for this, including worries about data security, even

though cloud-hosted data is typically more secure than on-site data, particularly for SMEs, the majority of which may not have data security experts (Kalinaki et al., 2022).

Particularly, Kampala's SMEs use of cloud computing is minimal (Kasse et al., 2015). A contributing factor in Kampala's SMEs' low adoption of cloud computing was the Ugandan government's inability to create a supportive IT environment (Kasse et al., 2015). This is also consistent with Namisango et al.'s (2014) assertion that, despite the Ugandan government's efforts to support SMEs through ICT by improving internet infrastructure, cloud computing adoption among SMEs is still very low throughout the nation, and particularly in Kampala.

This study's objective was to provide proof of the elements and innovation traits that might encourage SMEs to adopt cloud computing.

### **Review of the literature**

Venters and Whitley (2012) explored the intersection between cloud computing and start-ups. However, their investigation was purely a literature-based study and lacked empirical evidence. Ries (2011) focuses on lean start-ups, which he argues is a new approach that is changing the way businesses are built and new products are launched. Furthermore, Venters and Whitley (2012) argued that cloud computing enabled innovation by “lowering the transaction costs associated with innovation and enabling the development of value networks”. The gap left by these scholars, though, is that they didn't realize the cost

wouldn't be an issue if that decision to adopt cloud computing was not reached.

Today, more services are offered on the Web and more storage is required. The huge ability to compute, which is necessary nowadays is only possible if providers are committed to infrastructure sharing efficiently because this reduces costs, and it is why cloud computing is necessary (Mu & Stern, 2015). Cloud computing may enable innovation in business by reducing the cost of innovation and development of value networks (Gkikas, 2014). Experiments are a key enabler of innovation, and cloud resources are much faster to provide and configure compared to traditional computing resources. They are also much cheaper (Stanoevska-Slabeva et al., 2010). Cloud computing-enabled innovation creates a competitive advantage by lowering the cost and time required to innovate and bring products to market faster. Cloud computing enables business innovation by allowing businesses to a trial niche market with low-risk and high business agility through the Internet (Gastermann et al., 2015). However, these scholars left a gap in that they failed to recognize other factors that may influence the innovativeness associated with cloud computing in organizations including factors such as external support and competitive pressure as well.

Outside of the adopting company, the culture of cloud computing service providers must also be carefully considered. The development of cloud computing services is a complicated process that necessitates the consideration of many different areas of product development (Sultan, 2014, Hsinking et al., 2012, Sultan, 2013,

## **Innovation characteristics and the decision to adopt cloud computing by Small and Medium Enterprises in Kampala**

Marston et al., 2011, Takabi et al., 2010, Wei et al., 2014). When an organization adopts cloud computing services, it ought to take care of the risks that are not within the control of the company. However, these risk considerations will have an impact on cloud computing services' long-term viability for SMEs. Cloud computing service providers' risks, for example, will be incorporated into the product that consumers purchase. Businesses will have to constantly manage these risks due to their reliance on service providers (McGladrey, 2013). It is observed that though these scholars made an attempt to bring out the aspect of the adoption of cloud computing, they didn't recognize the decision makers' innovativeness and their knowledge which could work for or against their dependence on the cloud computing service providers.

Internal innovation should be explored in a collaborative framework in this case. For SMEs, this predicament reflects their need to comprehend the influence of the cloud computing services on their collaborative efforts. The degree of system integration will be crucial in optimizing internal procedures and identifying new business opportunities with key partners (Prasad et al., 2013). The gap here, though, is that these scholars, although they show the need for a collaborative context, they do not bring out the critical aspects that can determine such innovativeness in an organization, e.g. employees' cloud knowledge and cost of cloud computing services. These are some of the dimensions that this study looked at as independent variables to determine the adoption of cloud computing decisions.

Mobile computing devices such as netbooks, personal data assistants (PDAs), and a variety of smartphones have quickly evolved into a portal to the utility of cloud computing technologies (Greengard, 2010). Mobile computing and cloud computing developments have made an entrepreneurial economic contribution to underdeveloped economies, skipping the usual IT development process. Greengard (2010) used virtualization to develop iPhone apps in Nairobi, Kenya, where iPhone service is still unavailable and local computing resources are scarce. Consequently, the gap here is that the scholars did not put into consideration the fact that internet network connection in developing countries such as Uganda is very poor and struggling. This, therefore, can make cloud adoption in SMEs a daunting task as this could have to put into consideration so many aspects including location and choice of gadgets among others.

One of the most significant technological shifts in the recent decade has been cloud computing (Wang et al., 2011). Cloud computing is changing the way IT services are built, provided, scaled, updated, maintained, and paid for (Marston et al., 2011). Cloud computing's potential appears to have prompted high hopes, as seen by cloud aspirations (Venters & Whitley, 2012) and cloud capabilities (Lyer & Henderson, 2010). As a result of these expectations, cloud computing has aroused a lot of interest in both the corporate and academic realms (Venters & Whitley, 2012). In terms of top application and technical advancements, cloud computing was ranked second and third in an international study on

key information technology and management challenges in 2011 and 2012, respectively (Luftman & Zadeh, 2011). However, there is a gap consisting in the failure to address some of the dangers that may be born of cloud computing, the same dangers that most often scare away potential clients (SMEs) or that may make its adoption rather slow or difficult. This study tried to address though not all but major dimensions under innovation characteristics that may hinder cloud computing adoption.

Cloud computing should not be viewed as a stand-alone phenomenon in the IT business, but rather as a critical component of a larger IT industry revolution that affects the entire IT ecosystem. According to Voas and Zhang (2009), cloud computing emerged from previous computing paradigms such as PCs, networked computing, the internet, and grid computing. This, therefore, means that cloud computing has been a development of technologies over time.

### **Methods and Materials**

The positivist approach paradigm served as the study's foundation. Additionally, the study's design was both descriptive and explanatory. Additionally, it used a quantitative approach to gathering and analyzing data. 416 people were included in the study's sample.

SMEs in Kampala were sampled using the stratified sampling technique. The survey questionnaire method and a self-administered questionnaire as the data collection instrument were used to collect data.

Internal consistency was assessed using inter-item consistency reliability (Sekaran & Bougie, 2013) and split-half reliability (Cronbach's alpha).

The study used the Statistical Package for Social Sciences (SPSS) version 25 computer program to determine the reliability of the variables and determine Cronbach's Alpha coefficient. Each instrument's Cronbach's Alpha Coefficient had to be greater than 0.70 in order for the instruments to be considered reliable. The instrument was deemed satisfactory (Vogt et al., 2013) because the Cronbach's Alpha values were all greater than 0.7, which is the recommended number.

Pretesting was also used to demonstrate the clarity of the instrument. Before administering the instruments to the real sample, unclear instructions, incorrect numbering, and other issues were addressed and adjusted.

The instruments' content, criteria, and construct validity were evaluated to determine how well they were representative, captured relationships between variables, and measured ideas. The Content Validity Index was found to be 0.95 for all of the items in the questionnaire. In light of the fact that a CVI of at least 0.8 is highly regarded in terms of assessing validity, the questionnaire was therefore deemed to be reliable.

Frequency tables were processed in addition to the graphs for descriptive statistics. To determine the degree and scope of variation in the responses, respectively, the means and standard deviations were also processed.

## Innovation characteristics and the decision to adopt cloud computing by Small and Medium Enterprises in Kampala

### Results and Discussion

The study set out to establish the extent to which innovation characteristics influenced the decision to adopt cloud computing by Small and Medium Enterprises in Kampala. Pursuant to that, the study sought to

establish the respondents' decision on cloud computing adoption as a result of the innovation characteristics in the SMEs

The descriptive statistics therefrom are shown in Table 1 below:

**Table 1: Descriptive Statistics of Innovative Characteristics**

	N	Min.	Max.	Mean	Std. Deviation
Cloud computing enhances innovations in our business	307	3	5	3.78	.601
My company uses up-to-date Information to facilitate its innovations	307	2	5	3.42	1.001
Cloud computing enables this company to access information fast which is used for its innovations and development	307	3	4	3.82	.387
Cloud computing enables this company to have access to reliable, relevant, and accurate information that we use in our innovations	307	2	5	3.89	.707
There is a complexity that comes with the use of cloud computing	307	1	5	4.01	1.180
Cloud computing makes innovations in this company easy	307	2	4	3.40	.671
Cloud can easily be integrated into our existing IT infrastructure	307	1	4	2.62	1.032
I have a great deal of opportunity to try various types of cloud computing	307	1	4	2.39	.920
Cloud computing is available to me to adequately test run various applications	307	1	4	2.85	1.033
We have an Innovation culture in this business favoring cloud computing	307	1	4	2.98	1.101
Using cloud computing is compatible with our company's norms and culture	307	1	4	3.02	.913
The Trialability (Trialability is the ease with which customers can try a new product or service) of the cloud computing systems is conducive in this business	307	1	4	3.40	.921
With cloud computing in this company, our innovations are Secure	307	1	4	2.73	.918
We can have our business innovations kept private with the use of cloud computing	307	1	4	2.71	.790
Cloud computing enables us to have Strategic innovations in our business	307	1	4	3.01	.907
Valid N (listwise)	307				

**Source: Primary data (2021)**

When respondents were asked whether cloud computing enhanced innovations in their business, the majority of them agreed on the item (Mean = 3.78, St. Dev = .601) implying that many business people adopt cloud computing as an innovation strategy in their businesses.

The study also found that majority of the respondents agreed that their company used up-to-date information to facilitate its innovations (Mean = 3.42, St. Dev = 1.001) which can be attributed to another finding where they had strong agreement levels on the item that cloud computing enabled their company to access information fast which was used for its innovations and development (Mean = 3.82, St. Dev = .387). These findings can be understood alongside another finding with agreement levels that cloud computing enabled “the company to have access to reliable, relevant, and accurate information that we use in our innovations” (Mean = 3.89, St. Dev = .707). This implies that cloud computing enabled businesses to be up to date with the current trends in the industry.

The study however revealed that the strongest agreement levels were on the item that there was a complexity that comes with the use of cloud computing (Mean = 4.01, St. Dev = 1.180). This could imply that cloud computing adoption requires special training to get the best out of it. This is in line with previous studies by Ifinedo (2011b), Moore and Benbasat (1991), and Thiesse et al (2011), who found that the use of Cloud Computing requires a lot of mental effort; is frustrating is too complex for business operations, and the skills needed to

adopt Cloud Computing are too complex for employees of the firm.

Study findings also revealed that respondents agreed that “Cloud computing makes innovations in their company easy” (Mean = 3.40, St. Dev = .671) meaning that with the installation of the cloud computing system, there are opportunities that come with it regarding innovations.

However, the study showed that the majority of the respondents disagreed with the idea that “the cloud can easily be integrated into our existing IT infrastructure” (Mean = 2.62, St. Dev = 1.032). This could imply that the introduction of cloud computing in the business may require an installation of new IT infrastructure all at once that accommodates it.

Although the majority of the respondents agreed that they have a great deal of opportunity to try various types of cloud computing (Mean = 3.39, St. Dev = .920), there were also disagreement levels among respondents regarding the item that cloud computing was available to them to adequately test run various applications (Mean = 2.85, St. Dev = 1.033). However, the widely spread standard deviation on this item could account for the finding in the earlier former finding.

Study findings also revealed that the majority of the respondents disagreed that they had an innovation culture in their business favoring cloud computing (Mean = 2.98, St. Dev = 1.101) implying that essentially, SMEs in Kampala were not disposed to adopting cloud computing by default. Another finding showed that respondents agreed that “Using cloud

## **Innovation characteristics and the decision to adopt cloud computing by Small and Medium Enterprises in Kampala**

computing is compatible with our company's norms and culture” (Mean = 3.02, St. Dev = .913) implying the company’s culture determines the rate at which cloud computing will be adopted in the business.

The finding with the high agreement that the Trialability (Trialability is the ease with which customers can try a new product or service) of the cloud computing systems was conducive in this business (Mean = 3.40, St. Dev = .921) implies that adoption may be easy in the business. This is in tandem with findings by Ifinedo (2011b), Ghobakhloo et al (2011), and Thiesse et al (2011), who found that cloud Computing allows you to manage business operations in an efficient way, improves the quality of operations, allows workers to perform specific tasks more quickly, offers new opportunities, and increases business productivity.

Study finding with high disagreement on the item that with cloud computing in the company, their innovations were secure (Mean = 2.73, St. Dev = .918) and the finding that respondents could have their business innovations kept private with the use of cloud computing (Mean = 2.71, St. Dev = .790) can be attributed to earlier finding that showed that there are security risks linked with cloud computing adoption. This is in concert with earlier findings by Zhu et al (2006a), Luo et al (2010), and Wu (2011), who found that cloud computing had concerns about data security on the Internet, privacy on the Internet, and trustworthiness.

Lastly, the study showed that cloud computing enabled them to have strategic innovations in their business (Mean = 3.01, St. Dev = .907) showing how beneficial it

can be to a business that adopts it. These findings imply that cloud computing can help in the general planning for business progress and development.

### **Recommendations**

It has been observed that the study found that SMEs in Kampala which adopted cloud computing did so because it enhanced innovation in their firms; that cloud computing enabled businesses to be up to date with the current trends in the industry.

The study, therefore, recommends that the government of Uganda through its Ministry of Trade and Cooperatives or its agencies such as the Uganda Investment Authority— or the private sector umbrella organizations in Uganda namely; the Uganda National Chamber of Commerce and Industry, Private Sector Foundation, Uganda Small Scale Industries Association, or the Federation of Small and Medium Enterprises- Uganda— should proliferate the good news about the adoption of cloud computing by SMEs based on the experiences of those SMEs that have reaped the benefits that include enhanced innovation.

The study further recommends that the top management of the SMEs that have not yet decided to adopt cloud computing should be engaged by the government and its agencies as well as by the private sector umbrella organizations mentioned above, as to the innovation benefits of adopting cloud computing by their firms.

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## **Innovation characteristics and the decision to adopt cloud computing by Small and Medium Enterprises in Kampala**

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