

## A Conceptual Model for Cloud Computing Adoption: A Case Study on Bangladeshi SMEs Focused on Small Electronic Home Appliance

Dr. Mohammad Masudur Rahman<sup>1\*</sup> and Dr. Mohammad Naveed Ahmed<sup>2</sup>

### ARTICLE INFO

#### Article History:

Received: 31<sup>st</sup> December 2021

Accepted: 20<sup>th</sup> April 2022

#### Keywords:

Cloud Computing,  
DOI,  
Small Electronic Home Appliance,  
SMEs,  
TOE.

#### JEL Classification:

M15,  
O14,  
O33.

### ABSTRACT

**Purpose:** In the 21st century, cloud computing is an innovative idea that has revolutionized various sectors, IT organizations and many other organizations are shifting to the clouds because these offer many benefits such as infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS). Also, cloud computing provides the latest applications for Small and Medium Enterprises (SMEs) through the Internet with minimum start-up cost, easy sharing with remote location and pay-per-use services. According to a survey by Euro monitor International, SMEs mainly trade small Electronic Home Appliance (SEHA) goods, which are in general regarded luxury goods in many areas of the world, including Bangladesh, and are increasing at a 14 percent CAGR in Bangladesh from 2009 to 2014. However, SEHA goods need to be followed up from the beginning of its production until after sales, i.e. warranty, customer relation management, spare parts requirement and others. Therefore, cloud computing may be used to have proper monitoring purpose.

**Methodology:** In this study, the TOE and DOI models were adapted and extended. Based on qualitative research, this study developed a conceptual framework after completing qualitative data analysis in the context of Bangladeshi SME focused on SEHA.

**Findings:** The results of this research developed an integrated research model based on online interview and explored some important factors.

**Practical Implications:** This model aids in identifying the influences of cloud computing on SMEs that have yet to embrace cloud services but are considering it. It is widely accepted that SMEs should use cloud services not just to save money on administration, but also to improve efficiency and productivity.

**Originality:** This research has explored the most prominent themes through online interview. The findings of the study offer valuable themes to cloud providers, managers, and government authorities on how to encourage the adoption of cloud computing in SME in developing countries.

**Limitation:** This research developed a conceptual framework; in future this conceptual framework will be validated to generalize the issue.

## 1. Introduction

In the present digital era, it is quite impossible to run the business without adopting the latest technologies to communicate with clients or to keep track of sales. Many Small and Medium Enterprises (SMEs) are shifting to the virtual clouds because it is “a platform that brings flexible and cost-effective benefits to SMEs” (Shimba, 2010; Widyastuti, and Irwansyah, 2018). Cloud computing technology also offers many benefits such as infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS). Another benefit of cloud computing is that it

\* Corresponding Author.

<sup>1</sup> Senior Lecturer, Department of Business Administration, East West University, Dhaka, Bangladesh. Email: masudur@ewubd.edu

<sup>2</sup> Managing Director, Miyako Appliance Limited, Dhaka, Bangladesh. Email: naveed@miyakomarketing.com

overcomes the weaknesses of traditional servers to make faster speed, scalability and efficiency (Kumar and Samalia, 2016).

Along with these benefits, it also improves internal and external processes such as warranty, customer relation management, spare parts requirement, and supply chain management, monitoring system, fast-tracking communication with the customer, expanding markets, backup data, decision-making process and others. Given the benefits of cloud computing, SMEs are supposed to be eager in adopting cloud computing. However, poor infrastructure hinders in fulfilling the business expectations of the businessmen and does not encourage them to adopt the technology (Widyastuti and Irwansyah, 2018).

Traditional Information Technology (IT) is preferred by Bangladeshi SMEs concentrating on SEHA at the moment, as it requires servers and computers to be connected. The owners are still unwilling to adopt the cloud computing services due to the lack of knowledge benefits of using it. For instance, cloud computing adds extra risk-level encounters to make it more secure and to maintain privacy (Senarathna et al., 2018; Hashizume et al., 2013; Khalil, Khreishah, and Azeem, 2014). That is why empirical inquiry must be carried out to provide a clear guideline to the Bangladeshi Small Electronic Home Appliance (SEHA) for adopting cloud computing services in order to make implementation of cloud computing effective. Therefore, a model for adopting cloud computing is a necessity for the SMEs, especially for the electronic home appliance sector in Bangladesh. To formulate the adaptation framework, this paper views the intention of adopting the cloud computing from different angles.

The SMEs usually trade small Electronic Home Appliance goods which are in general considered as luxury goods in many parts of the world, but SMEs trade those goods in Bangladesh and it is growing in Bangladesh at the rate of 14% CAGR from 2009-2014 based on a report by Euro monitor International. Moreover, home appliance traders run their businesses from their small premises or showroom as they want to be vibrant in the market. As they do not move to large offices as they feel it will be expensive for them. They are reluctant to invest in IT infrastructure as well which they consider as an extra cost. However, bringing the gap of their knowledge on benefits and advantages of cloud computing will help them not only to save cost on administration but also will make it more efficient.

Hence, the current study aims to find out what challenges Bangladeshi Small Electronic Home Appliance manufacturers face while adopting cloud computing technology with an integrated model developed by adapting the technology-organization-environment (TOE) and diffusion of innovation (DOI) theory. The study will be significant in displaying a clear picture of adopting cloud computing in SEHA good in developing countries such as Bangladesh where such SMEs play a significant role in poverty by creating job opportunities for the unemployment population of the country (Abdin and Begum, 2015; Bakhat and Basher, 2015; Rahayu and Day, 2015). In return, appropriate development of small businesses will have a remarkable effect on the fiscal earning of a developing country such as Bangladesh.

## **2. Literature Review**

In the era of the Internet of Things (IoT), cloud computing is increasing data center technology with growing traffic on the Internet. Cloud computing allows business firms or individuals to keep

documents on this network, and then these documents can be retrieved from remote locations which means that the users can use other computers and outside the network just through the help of the Internet. Hence, a user does not have to install or run software programmes in personal computer or laptops while using cloud computing technology, but instead stores on the server's network which is accessed through the Internet from anywhere. This is can be accessible as cloud computing provides data storage, online applications, (Al Cattan, 2014; Balco, Law, and Drahošová, 2017); collaboration, infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS) (Mell and Grance, 2011), and communication as a service (Rao et al., 2015) through services which are offered by Cloud service providers. In addition, cloud computing provides latest applications for Small and Medium Enterprises (SMEs) via Internet with minimum start-up cost, easy sharing with remote location and pay-as-you-go pricing model (Sachdeva, Rana, Kapoor, and Shahid, 2011; Mazrekaj, Shabani, and Sejdiu, (2016); Tariq, Tayyaba, Rasheed, and Ashraf, (2017); Zhang et al., 2017).

Past research has on cloud computing in Small and Medium Enterprises (SMEs) from various research organizations and scholars identify various problems in adopting cloud computing. In one such study, Intuit Inc. (2013) has identified some challenges of adopting cloud computing by SMEs such as cost, lack of technical skilled human resources, low awareness of benefits of cloud computing technology, security and privacy issues and existing poor infrastructure. Similarly, Qian, Baharudin, and Jebna (2016) identified factors such as security and privacy, top management support, cost-effectiveness, Internet reliability, and competitive pressure as factors of adopting cloud computing in SMEs. However, at the top of their list of factors were top management support that influences adopting cloud computing in the SMEs focused on the manufacturing sector in Malaysia. Xue (2016) discusses the adoption issues of implementing cloud computing in SMEs focused on telemetry equipment manufacturing industry those are still not adopting cloud computing because of security and privacy issues.

On the other hand, Abdollah zadegan, (2013), and Sandu and Gide (2018) identified that important success factors of cloud computing in SMEs consist of three organizational factors such as top management support, firm size and technological readiness. Many others organizational factors can be considered innovativeness of the firm, IS knowledge, financial readiness, organizational culture also crucial that impact on cloud computing in SMEs. Decision-makers can consider these factors in SMEs that want to evaluate the implementation of cloud-based services in their firms. Cloud flexibility, perceived concern, privacy, relative advantage, perceived cost-benefit, quality of service, and top management support are among the top cloud adoption priorities that need to be improved in the creative industry to ensure that cloud computing adoption is more apparent in Indonesian creative industry, according to Gui et al., (2021). In this regard, Hussin et al., (2018) believe that determining the appropriate path to adopt cloud computing can facilitate SMEs' to sustain in the cloud computing adoption. Kim, Jang, and Yang (2017) found SMEs are concerned with security risks than the financial or performance risks, improving business processes rather than cost, management support is more important than resources and vendor support is important than support from the government when adopting Software as a Service (SaaS).

**Table 1. Previous Studies on Cloud Computing Adopting in SMEs**

Author	Year	Context	Framework	Methods	Variables
Yazn Al shamail, Savvas Papagiann, Feng Li.	2013	UK	TOE	Interview	Relative advantage, uncertainty, compatibility, complexity, trial ability, size, top management support, innovativeness, prior technology experience, competitive pressure, industry, market scope, supplier computing support.
Amini and Bakri.	2015	Malaysia	TOE and DOI	Survey	Relative advantage, compatibility, security, cost-saving, technology readiness, top management support, competitive pressure and regulatory support.
John Paul Kasse, Moya Musa, Nakawoya Fatuma.	2015	Uganda	TOE	Survey	Industry characteristics & market structure, Technology support infrastructure, government regulation, innovation, decision making, availability, characteristics, formal and informal structures, communication process and size and slack.
Hemlata Gangwar, Hema Date, R Ramaswamy.	2015	India	TOE and TAM	Survey	Technological (Relative Advantage, Compatibility, Complexity) Organisational (Readiness, Top management commitment, Training and Education) Environment (Competitive Pressure and Trading Partner Support).
Tatjana Vasiljeva, Sabina Shaikhulina, Karlis Kreslins.	2016	Latvia	Conceptual Model	Survey	Legal compliance, unclear payment mode, infrastructure, control, security and privacy, cost saving, collaboration.
Hsin-Pin Fu, Tsung-Sheng Chang.	2016	Taiwan	TOE	Survey	Support of senior management, organizational policies, system information security.
Robert Deli and Philipp Brune.	2017	Germany	TOE and DOI	Interview	Technology readiness, relative advantage, top management support, support of non-IT employees, firm size, competitive pressure, regulatory support, market environment.

Source: Author's Compilation

However, few researchers have conducted on adoption of cloud computing in SMEs context in Bangladesh. According to Rahman and Rahman, (2014) identified that More Developed Countries (MDCs) are quickly adopting the cloud computing and getting benefits because of their improved infrastructure compared to Less Developed Countries (LDCs). Mazumdar and Alharahsheh (2019) described about SMEs, such as definitions and characteristics, general issues, and technology adoption risks, particularly for Cloud Computing adoption risks. Kabir et al., (2015) proposed a framework to help the public and private organisation and they have discussed opportunities and obstacles of implementing cloud computing in Bangladesh. According to Khayer et al., (2020) performance expectancy, effort expectancy, absorptive capacity, data security and privacy, and perceived trust are all major determinants of cloud computing adoption. They also mentioned, cloud computing adoption has a positive impact on organizational performance both directly and indirectly through organizational agility. It is vital for any form of business firm to understand and realize that appropriation of cloud computing is not just a technical issue, but an organizational issue as well that comprise of clients, costs, organizational hierarchical issues (Hosseini, Greenwood, and Sommer ville, 2010; Marston et al., 2011) and ethical issue (Faragardi, 2017). Therefore, it is pertinent to evaluate the process of adoption of cloud computing beyond the technical aspects. Current investigations, for example, Service Level Agreement is not entirely connected with the risk analysis and return status in the endeavor that embraces Cloud Computing. As Cloud Computing requires a high level of commitment, research models may help to reduce the technical, financial and social risks (Benbasat and Barki, 2007; Silva, 2007; Eze et al., 2011).

### 3. A Conceptual Model and Hypotheses

The TOE and DOI models were adapted and extended in this study. This study discovered some significant themes based on qualitative research. After completing the qualitative data analysis in the setting of Bangladeshi SME focusing on SEHA, this study developed a conceptual framework.

#### 3.1 Themes Generated from the Qualitative Data

Interviews of the participants of the study were coded and categorized for creating a thematic pattern. The themes generated from this qualitative phase are given in the following table no 2

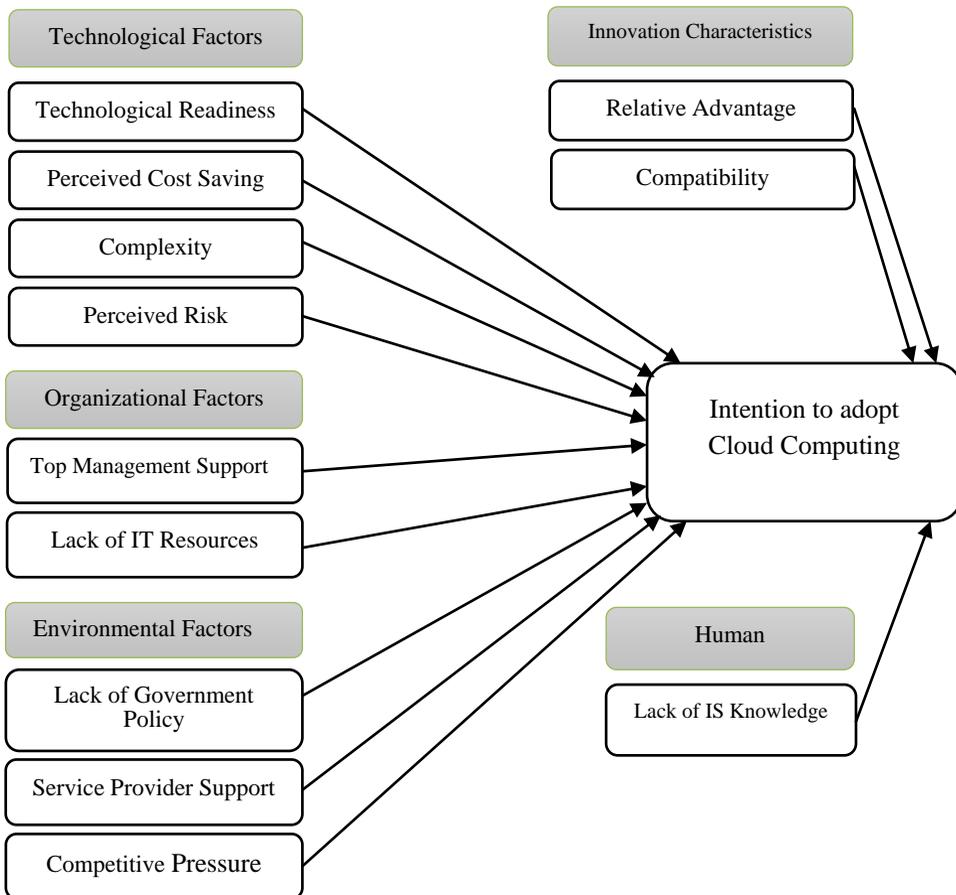
**Table 2. Themes to be considered cloud computing adoption in SMEs of Bangladesh**

Participants	SEHA 1	SEHA 2	SEHA 3	SEHA 4	SEHA 5	SEHA 6	FREQUENCY	PERCENTAGE
Themes								
Technological Readiness	✓	×	✓	✓	✓	✓	5	83%
Perceived Cost Saving	✓	✓	✓	✓	✓	✓	6	100%
Complexity	✓	×	✓	✓	✓	✓	5	83%
Perceived Risk	✓	✓	✓	✓	✓	✓	6	100%
Top Management Support	✓	×	✓	×	✓	✓	4	67%
Lack of IT Resources	✓	✓	✓	✓	×	✓	5	83%
Lack of Government Policy	✓	✓	✓	✓	✓	✓	6	100%
Service Provider Support	✓	✓	✓	✓	×	✓	5	83%
Competitive Pressure	×	✓	✓	×	✓	×	4	67%
Relative Advantage	✓	✓	×	✓	✓	×	4	67%

Compatibility	✓	✓	✓	×	×	×	3	50%
Lack of IS Knowledge	✓	✓	✓	✓	✓	✓	6	100%

Source: Author's created

In the above table 2 the leftmost column lists 12 prominent factors mentioned by the interviewees. The topmost row consists of 6 participants from SME focused on SEHA in Dhaka, Bangladesh. Here organizations are named with a code that symbolize for example SEHA1 stands for small Electronic Home Appliance 1 (Please see row 1 column 1 in table 3.1). The tick marks on the table are put against those themes that the participants have mentioned in the interview. On the other hand, the cross marks indicate that those themes were not mentioned by the participants.



**Figure 1.** Proposed Conceptual Model for Cloud Computing Adoption on SEHA

The previous research by Asiaei and Rahim (2016) a perception-based model for cloud computing adoption applying a TOE and DOI model, it described and recommended that the procedure by which an organization adopts and implements the new technological innovation is influenced by the factors such as technological, organizational, environmental, human attitude and innovation characteristics.

### 3.2 Technological Context

Innovative setting alludes to advances that apply to the organization (Tornatzky and Fleischer, 1990). Technological Readiness (Hassan et al., 2017, cost saving (Dornelas, Souza, and Amorim, 2017) and complexity (Dornelas, Souza, and Amorim, 2017) have been often referred to as significant drivers of cloud computing adoption in small and medium enterprises.

### 3.3 Technological Readiness

Technology readiness refers to evaluate the readiness of existing technologies in the organization (Abdollah zadehgan, Razak, and Hussin, 2013; Mohammed and Ibrahim, 2013; Ahmadzada, Zayyad, and Toycan, 2016). It is significant for determining the adoption of cloud computing in an organization and is viewed as influential, either as a facilitator (Oliveira et al., 2014; Tornatzky and Fleischer, 1990). Prior studies have proposed that technology infrastructure can be built up a critical stage on which innovation can be executed (Iacovou et al., 1995). The findings revealed that 5 out of 6 (n=5, 83%) agreed that the readiness of existing technologies in the organizations are positive influences for adopting of cloud computing in SEHA of Bangladesh.

### 3.4 Perceived Cost Saving

Cloud computing is for the most accepting in IT cost-cutting for all types of business including SMEs or large organizations as it reduces upfront cost, maintaining operations cost and IT related costs. Adoption of cloud computing in SMEs not only reduce the cost, but it also improves the service quality. Cloud computing altogether diminishes or takes out the requirement for starting investment in IT framework in the organization. In this way allowing organizations access groundbreaking foundation through renting without purchasing them inside and out. Moreover, this enables SMEs and new businesses to startups to start small and systematically increase computing resources based on their requirements. Furthermore, organizations can divert cash-flow to focus on core business ventures. Likewise, cloud computing's "pay as you use" model. This proportion of paying for the resources used is more advantageous than buying infrastructure as they might either be over-utilized or under-utilized (Erl et al., 2013). Participants identified that using cloud computing reduces costs as well. In this study, 100% (6/6) of the participants pointed out that reduced cost is one of the positive themes that help to adopt cloud computing in SEHA. One of the participants said that;

*“Cloud computing is providing many free services. Even we do not have to pay for software license fee, upgrading and maintenance fees (SEHA5).”*

### 3.5 Complexity

Complexity is defined as the perceived degree of difficulty of understanding and using a system (Sonnenwald et al., 2001). In case of cloud computing adoption, it is measured as the time taken to perform tasks, integration of applications with the specialized cloud infrastructure, efficiency of data transfer, system functionality, and interface design, and others. Generally, it is perceived to quite close to easing of use; there are many studies treating it as two independent constructs. This factor had received mixed responses from participants. Complexity was identified as an issue which influences cloud computing adoption negatively by participants in SEHA. Out of 6 participants, 5 (83%) participants mentioned that complexity affects cloud computing adoption negatively in SME

in Bangladesh. They have mentioned that using cloud computing is not easy because it is a new technology, they do not have proper training and adequate knowledge on cloud computing. That is why complexity has a negative effect on cloud computing adoption in SEHA of Bangladesh. One of the participants mentioned,

*“Yes, in order to use it quicker at the beginning, I need a lot of time to know what the application contains (SEHA 1).”*

### **3.6 Perceived Risk**

Perceived risk indicates a blend of security and privacy risk that influence how users react to in terms of deciding on adopting a specific technology (Dowling, 1986). Security is an occurrence in which an organization losses data, records, or other critical information (Bishop, 2012; Oliveira et al., 2014). Privacy is an issue that affects the organization or individual, essentially to “control and protect the personal information within an organization” that “can lead to an unauthorized access to users account” (Zissis & Lekkas 2012). So, perceived risk has an impact on the trust of individuals in the decisions. In this study, perceived risk is defined as the amount to which organizational decision makers view cloud computing applications as a source of lack of security and privacy. Therefore, perceived risk has an impact on the trust in the decisions. Perceived risk was identified as one of the most negative significant factors by for cloud computing adoption in SEHA. Out of 6 participants, all of them mentioned that perceived risk affect cloud computing adoption in a negative way. In this study, participants opined that security and privacy are the challenging issues in adopting cloud computing in SEHA of Bangladesh. Majority of the participants mentioned breach of privacy and security issues as obstacles to use cloud computing services. One of the interviewees said;

*“Definitely, we are concern about our data security and privacy. If someone uses or opens our files, we should receive an email or message of warning (SEHA 6).”*

### **3.7 Organizational Context**

Organizational context refers to an organization’s size, scope, and the amount of slack resources available internally, or other internal aspects of the organization (Tornatzky and Fleischer, 1990). In this study, the organizational factors covered are top management support, lack of IT resources and firm size.

### **3.8 Top Management Support**

Top management support refers to the fact that willingness of the senior management to approve sufficient fund, human and technological resources and other supports for allowing the new technology in the organization. Top management as the organization’s decision taker should understand the benefits of the innovative technology and how it creates competitiveness (Alshamalia et al., 2013). Top management support is important to ensure that all the resources needed to adopt technology are available (Oliveira et al., 2014). Without top management support, lead to the failure of new technology implementation (Grandon and Pearson, 2004). Therefore, if decision makers of the SME notice cloud computing beneficial for the firm and easy to implement

then the chances of its adoption increase significantly. Top management support is positively influencing adoption of cloud computing for SME in Bangladesh.

### **3.9 Lack of IT Resources**

Lack of IT resources refers to the organization's readiness in terms of technological resources it has for adopting new technology (Hassan et al., 2017). IT infrastructure is relevant for determining the adoption of new technology in the organization. Lack of IT resources is a barrier that could affect the adoption of cloud computing applications as mentioned by participants.

### **3.10 Environmental Context**

Environmental context refers to the external environment where the organization operates. The environmental factors can be either the restrictions or the enablers for technology adoption (Hsu et al., 2014). The environmental factor such as lack of government regulatory, vendor reliability and competitive pressure are covered in this study.

### **3.11 Lack of Government Policy**

Government regulatory Policy is another environmental factor that affects technology adoption in the organization. Firms operating in an environment where government policies are obstructive have a hindering of technology adoption. The impact of existing laws and regulations can be critical in the adoption of new technologies (Alshamail, Papagiann, and Li, 2013). Lack of government policy is an issue which hinders cloud computing adoption in SEHA of Bangladesh, mentioned by 6 out of 6 (100%) participants.

### **3.12 Service Provider Support**

In Cloud computing environment, the firms will get resources as a service from service providers. The firms will have depended on service providers for all types of IT services. Therefore, reputation, reliability and support from service providers become vital for secure and uninterrupted Cloud services (Kumar, Samalia, and Verma, 2017). 83% participants are agreed that Service providers' support positively influences the intention to adopt Cloud Computing by SMEs.

### **3.13 Competitive Pressure**

Competition pressure refers to "the degree that the firm is affected by competitors in the market" (Zhu, Xu and Dedrick, 2003; Oliveira et al., 2014). The competitive pressure faced by a firm is a strong motivation to adopt relevant new technologies (Majumdar et al., 1992). Therefore, for small businesses, this can become a necessary and strategic move toward new technologies to gain competitive grounds over rivals. 4 out of 6 participants mentioned that competitive pressure positively influences the intention to adopt Cloud computing by SMEs.

### **3.14 Relative Advantage**

The relative advantage defined by Rogers (2003) is "the degree to which an innovation is perceived as being better than the idea it supersedes". In this study, the innovation referred to is cloud computing and the superseded idea is the other computing paradigms. 67% participants are agreed that relative advantage positively influences the intention to adopt Cloud computing by SMEs.

### 3.15 Compatibility

Rogers (2003) characterizes similarity as "how much the advancement fits with the potential adopter's current qualities, past practices, and current needs." Compatibility is a vital determinant of development selection (Ling, 2001; Dedrick, and West, 2004; Azadegan, and Teich, 2010; Macredie, R. D., and Mijinyawa, 2011). For instance, if the motivation behind receiving cloud computing is to exploit the versatility benefits for applications with low-security concerns, at that point offloading the capability to the Cloud infrastructure makes economic sense. Subsequently, business ability and compatibility are factors that will decide if an organization will embrace cloud computing. 50% of the participants mentioned that compatibility positively influences intention to adopt Cloud computing by SMEs.

### 3.16 Lack of IS Knowledge

In general, small businesses are lacking in technical skills (Plomp et al., 2014). The lack of IS knowledge and IT skills are widespread impediments to effective uptake both during the decision-making process, as well as once adoption decisions are made. Lack of skills and IS knowledge required when innovation must need to be adopted (Jafarnejad et al., 2013). All of the participants were agreed that lack of IS knowledge have a negative influence on adoption of Cloud computing in SMEs.

## 4. Conclusion

This paper established a conceptual model based on online interviews with SMEs in Bangladesh who specialize in Small Electronic Home Appliances (SEHA). This model contributes towards identifying the factors of cloud computing on SMEs owner who is yet to adopt cloud services in considering the option. It is globally established that SMEs need to adopt cloud services, not only for reducing cost on administration but also will make it more efficient and productive. Nevertheless, this model needs to be validated and tested, and that is future work planned for this research.

## References

- Abdin, M. J., and Begum, A. A. (2015). Employment Generation and Poverty Alleviation through SME Cluster Development in Bangladesh. SSRN Electronic Journal. <http://doi.org/10.2139/ssrn.2584327>
- Abdollah zadegan, A., Hussin., A.R.C., Gohary, M.M., Amini, M. (2013).
- Abdollah zadegan, A., CheHussin, A. R., MoshfeghGohary, M., & Amini, M. (2013). The organizational critical success factors for adopting cloud computing in SMEs. *Journal of Information Systems Research and Innovation (JISRI)*, 4(1), 67-74
- Ahmadzada, S., Zayyad, M. A., & Toycan, M. (2016, October). Readiness assessment for the use of cloud computing in eHealth systems: a field study of hospitals in the capital of Azerbaijan. In *2016 HONET-ICT* (pp. 141-144). IEEE.
- Alshamaila, Y., Papagiannidis, S., & Li, F. (2013). Cloud computing adoption by smes in the North East of england. *Journal of Enterprise Information Management*, 26(3), 250–275. <https://doi.org/10.1108/17410391311325225>

- Asiaei, A., & Rahim, N. A. (2019, May 31). [PDF] *conceptualizing a model for cloud computing adoption by smes: Semantic scholar*. [Pdf] Conceptualizing A Model For Cloud Computing Adoption By SMEs | Semantic Scholar. Retrieved April 14, 2022, from <https://www.semanticscholar.org/paper/Conceptualizing-A-Model-For-Cloud-Computing-By-SMEs-Asiaei-Rahim/f66e1aed26281b4854cdc8d4e7ac6fa590190306>
- Azadegan, A., & Teich, J. (2010). Effective benchmarking of innovation adoptions. *Benchmarking: An International Journal*, 17(4), 472–490. <https://doi.org/10.1108/14635771011060558>
- Bakht, Z., & Basher, A. (2015). Strategy for Development of the SME Sector in Bangladesh. *Bangladesh Institute of Development Studies, Dhaka*. Retrieve from [http://www.plancomm.gov.bd/wp-content/uploads/2015/02/2\\_Strategy-for-Development-of-SME-in-Bangladesh.pdf](http://www.plancomm.gov.bd/wp-content/uploads/2015/02/2_Strategy-for-Development-of-SME-in-Bangladesh.pdf)
- Balco, P., Law, J., & Drahošová, M. (2017). Cloud market analysis from Customer Perspective. *Procedia Computer Science*, 109, 1022–1027.
- Begum, A. A., & Abdin, M. J. (2015). Employment generation and poverty alleviation through SME Cluster Development in Bangladesh. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2584327>
- Benbasat, I., & Barki, H. (2007). Quo Vadis Tam? *Journal of the Association for Information Systems*, 8(4), 211–218. <https://doi.org/10.17705/1jais.00126>
- D Macredie, R., & Mijinyawa, K. (2011). A theory-grounded framework of open source software adoption in smes. *European Journal of Information Systems*, 20(2), 237–250. <https://doi.org/10.1057/ejis.2010.60>
- Dedrick, J., & West, J. (2004, January). An exploratory study into open source platform adoption. In *37th Annual Hawaii International Conference on System Sciences, 2004. Proceedings of the* (pp. 10-pp). IEEE.
- Deilr, R., & Brune, P. (2017, June). Cloudy with a Chance of Usage?-Towards a Model of Cloud Computing Adoption in German SME. In *CAiSE-Forum-DC* (Vol. 1485, pp. 65-72).
- Dornelas, J. S., Souza, K. R., & Amorim, A. N. (2017). Cloud computing: Searching its use in Public Management Environments. *Journal of Information Systems and Technology Management*, 14(2), 281–306. <https://doi.org/10.4301/s1807-17752017000200008>
- Eze, S. C., Okoye, J. C., Nebo, O. G., Ohakwe, S. N., Chukwuemeka, E., & Anazodo, R. (2011). Using the Characteristics of Small Business Managers to Understand Information Technology (IT) Adoption in Nigeria. *International Journal of Business and Social Science*, 2(13), 82–91.
- Faragardi, H. R. (2017). Ethical considerations in cloud computing systems. *Multidisciplinary Digital Publishing Institute Proceedings*, 1(3), 166.
- Fouad Al Cattan, R. (2014). Integration of cloud computing and WEB2.0 collaboration technologies in e-learning. *International Journal of Computer Trends and Technology*, 12(1), 46–55. <https://doi.org/10.14445/22312803/ijctt-v12p110>
- Fu, H.-P., & Chang, T.-S. (2016). An analysis of the factors affecting the adoption of cloud consumer relationship management in the machinery industry in Taiwan. *Information Development*, 32(5), 1741–1756. <https://doi.org/10.1177/0266666915623318>
- Gangwar, H., Date, H., & Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated tam-toe model. *Journal of Enterprise Information Management*, 28(1), 107–130. <https://doi.org/10.1108/jeim-08-2013-0065>

- Grandon, E., and Pearson, J. M. (2004). E-Commerce Adoption: Perceptions of Managers/Owners of Small and Medium Sized Firms in Chile. *Communication of the Association for Information Systems, 13*(8), pp.81-102.
- Gui, A., Fernando, Y., Shaharudin, M. S., Mokhtar, M., Karmawan, I. G., & Suryanto, -. (2021). Drivers of cloud computing adoption in small medium enterprises of Indonesia Creative Industry. *JOIV: International Journal on Informatics Visualization, 5*(1), 69. <https://doi.org/10.30630/joiv.5.1.461>
- Hashizume, K., Rosado, D. G., Fernández-Medina, E., & Fernandez, E. B. (2013). An analysis of security issues for cloud computing. *Journal of Internet Services and Applications, 4*(1), 5. <https://doi.org/10.1186/1869-0238-4-5>
- Hassan, H., Mohd Nasir, M. H., & Khairudin, N. (2017). Cloud computing adoption in organizations: Review of Empirical Literature. *SHS Web of Conferences, 34*, 02001. <https://doi.org/10.1051/shsconf/20173402001>
- Hsu, P.-F., Ray, S., & Li-Hsieh, Y.-Y. (2014). Examining cloud computing adoption intention, pricing mechanism, and deployment model. *International Journal of Information Management, 34*(4), 474–488. <https://doi.org/10.1016/j.ijinfomgt.2014.04.006>
- Hussin, H., Salleh, N. A., Suhaimi, M. A., Rahman, M. M., & Ali, A. M. (2018). A model to assess the impacts of cloud computing use on SME Performance: A resource-based view. *Advanced Science Letters, 24*(3), 1800–1804. <https://doi.org/10.1166/asl.2018.11164>
- Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic Data Interchange and small organizations: Adoption and impact of Technology. *MIS Quarterly, 19*(4), 465. <https://doi.org/10.2307/249629>
- Islam, S., Kabir, M., Hossain, M. J., Chakraborty, A., & Majadi, N. (2015). Cloud Computing Technology In Bangladesh: A Framework of Social & Economic Development. *European Scientific Journal, ESJ, 11*(18). Retrieved from <https://eujournal.org/index.php/esj/article/view/5849>
- Jafarnejad, A., Abbaszadeh, M. A., Ebrahimi, M., & Abtahi, S. M. (2013). Analysis of barriers to entrepreneurship in small and medium-sized enterprises (SMEs). *International Journal of Academic Research in Economics and Management Sciences, 2*(4). <https://doi.org/10.6007/ijarems/v2-i4/155>
- Kasse, j. P., Musa, M., and Fatuma, N. (2015). A Validated Framework for Cloud Computing Adoption by SMEs in Uganda. *International Journal of Information Research and Review, 2*(12), 1482-1488.
- Khajeh-Hosseini, A., Greenwood, D., & Sommerville, I. (2010). Cloud migration: A case study of migrating an enterprise IT system to IAAS. *2010 IEEE 3rd International Conference on Cloud Computing*. <https://doi.org/10.1109/cloud.2010.37>
- Khalil, I., Khreishah, A., & Azeem, M. (2014). Cloud computing security: A survey. *Computers, 3*(1), 1–35. <https://doi.org/10.3390/computers3010001>
- Khayer, A., Jahan, N., Hossain, M. N., & Hossain, M. Y. (2020). The adoption of cloud computing in small and Medium Enterprises: A developing country perspective. *VINE Journal of Information and Knowledge Management Systems, 51*(1), 64–91. <https://doi.org/10.1108/vjikms-05-2019-0064>

- Kim, S. H., Jang, S. Y., & Yang, K. H. (2016). Analysis of the determinants of software-as-a-service adoption in small businesses: Risks, benefits, and organizational and environmental factors. *Journal of Small Business Management*, 55(2), 303–325. <https://doi.org/10.1111/jsbm.12304>
- Kumar, D., & Samalia, H. V. (2016). Investigating factors affecting cloud computing adoption by smes in Himachal pradesh. *2016 IEEE International Conference on Cloud Computing in Emerging Markets (CCEM)*. <https://doi.org/10.1109/ccem.2016.012>
- Ling, C. Y. (2001). Model of factors influences on electronic commerce adoption and diffusion in small and medium sized enterprises, *Doctoral Consortium on 9th European Conference on Information Systems*, Bled, Slovenia.
- Mahmood, Z., Puttini, R., Zaigham, T. E. (2013). <https://ptgmedia.pearsoncmg.com/images/9780133387520/samplepages/0133387526.pdf>. Pearson.
- Mahyar, M., & Bakri, A. (2016). Cloud Computing Adoption by SMEs in the Malaysia: A Multi-Perspective Framework based on DOI theory and TOE Framework. *Journal of Information Technology & Information Systems Research (JITISR)*, 9(2), 121–135.
- Majumdar, S., Flasher, D., Friend, D. S., Nassos, P., Yajko, D., Hadley, W. K., & Düzgüneş, N. (1992). Efficacies of liposome-encapsulated streptomycin and ciprofloxacin against mycobacterium avium-M. intracellulare complex infections in human peripheral blood monocyte/macrophages. *Antimicrobial Agents and Chemotherapy*, 36(12), 2808–2815. <https://doi.org/10.1128/aac.36.12.2808>
- Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing — the business perspective. *Decision Support Systems*, 51(1), 176–189. <https://doi.org/10.1016/j.dss.2010.12.006>
- Mazrekaj, A., Shabani, I., & Sejdiu, B. (2016). Pricing schemes in cloud computing: An overview. *International Journal of Advanced Computer Science and Applications*, 7(2). <https://doi.org/10.14569/ijacsa.2016.070211>
- Mazumdar, A., & Alharahsheh, H. (2019). *Cross Current International Journal of Economics, Management and Media Studies*, 1(5), 130–140. <https://doi.org/10.36344/ccijemms>
- Mell, P., & Grance, T. (2011). The NIST Definition of Cloud Computing. NIST, USA. Available: <http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf>.
- Mohammed, F., & Ibrahim, O. (2013). Refining E-government readiness index by cloud computing. *JurnalTeknologi*, 65(1). <https://doi.org/10.11113/jt.v65.1759>
- Oliveira, T., Thomas, M., & Espadanal, M. (2014). Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information & Management*, 51(5), 497–510. <https://doi.org/10.1016/j.im.2014.03.006>
- Qian, L. Y., Baharudin, A. S., & Jebna, A. K. (2016). Factors Affecting the adoption of enterprise resource planning (ERP) on Cloud among Small Medium Enterprises (SEMs) in Penang, Malaysia. *Journal of Theoretical and Applied Information Technology*, 88(3), 398–409.
- Rahayu, R., & Day, J. (2015). Determinant factors of e-commerce adoption by SMEs in developing country: Evidence from Indonesia. *Procedia - Social and Behavioral Sciences*, 195, 142–150. <https://doi.org/10.1016/j.sbspro.2015.06.423>
- Rahman, M. A., & Rahman, M. M. (2014). Improvements of Cloud Computing: Scenario of MDCs and LDCs. *International Journal of Scientific & Engineering Research*, 5(2), 262-267.

- Rogers, E. M. (2003). *Diffusion of innovations*. Free Press, USA, New York.
- Sachdeva, M., Rana, P., Kapoor, R., & Shahid, M. (2011). Cloud Computing-pay as you go technology. *The 5th National Conference on Computing for National Development*, New Delhi, India.
- Sandu, R., & Gide, E. (2018). Technological, organisational and environmental (TOE) factors that influence the adoption of cloud based service SMEs in India. *2018 IEEE 11th International Conference on Cloud Computing (CLOUD)*. <https://doi.org/10.1109/cloud.2018.00123>
- Senarathna, I., Wilkin, C., Warren, M., Yeoh, W., & Salzman, S. (2018). Factors that influence adoption of cloud computing: An empirical study of Australian smes. *Australasian Journal of Information Systems*, 22. <https://doi.org/10.3127/ajis.v22i0.1603>
- Shimba, F. (2010). "Cloud Computing: Strategies for Cloud Computing Adoption", Dissertation: Doctoral in Computing, Dublin Institute of Technology.
- Silva, L. (2007). Post-positivist review of Technology Acceptance Model. *Journal of the Association for Information Systems*, 8(4), 255–266. <https://doi.org/10.17705/1jais.00121>
- Sonnenwald DH., MaglaughlinKL., & Whitton MC (2001). Using Innovation theory to guide Collaborative Technology Innovation: Work in Progress. IEEE 10<sup>th</sup> International Workshop on enhancing technologies: Infrastructure for Collaborative Enterprises, USA.
- Tariq, M. I., Tayyaba, S., Rasheed, H., & Ashraf, M. W. (2017). Factors influencing the cloud computing adoption in Higher Education Institutions of Punjab, Pakistan. *2017 International Conference on Communication, Computing and Digital Systems (C-CODE)*. <https://doi.org/10.1109/c-code.2017.7918925>
- Tornatzky, L. & Fleischer, M. (1990). *The process of technology innovation*, Lexington, MA, Lexington Books.
- Vasiljeva, T., Shaikhulina, S., & Kreslins, K. (2017). Cloud computing: Business perspectives, benefits and challenges for small and Medium Enterprises (case of Latvia). *Procedia Engineering*, 178, 443–451. <https://doi.org/10.1016/j.proeng.2017.01.087>
- Widyastuti, D., & Irwansyah, M. (2018). Benefits and challenges of cloud computing technology adoption in small and Medium Enterprises (smes). *Proceedings of the 4th Bandung Creative Movement International Conference on Creative Industries 2017 (4th BCM 2017)*. <https://doi.org/10.2991/bcm-17.2018.46>
- Xue, C. T. S., (2016). Adoption Issues of Implementing Cloud Computing in Telemetry Equipment Manufacturing Industry. *Imperial Journal of Interdisciplinary Research (IJIR)*, 2(8), 257-261.
- Zhang, S., Yuan, D., Pan, L., Liu, S., Cui, L., & Meng, X. (2017). Selling reserved instances through pay-as-you-go model in cloud computing. *2017 IEEE International Conference on Web Services (ICWS)*. <https://doi.org/10.1109/icws.2017.25>
- Zhu, K., Xu, S., & Dedrick, J. (2003). Assessing Drivers of E-Business Value: Results of A Cross-Country Study. *Twenty-Fourth International Conference on Information Systems*. Retrieve from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.460.9112&rep=rep1&type=pdf>