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Abstract

In recent years, Cloud Computing (CC) is as one of the most relevant and significant research trends in Information technology (IT). This paper aims to identify the factors, benefits, and challenges while adopting CC in Higher Educational Institutions (HEIs) in Bangladesh. Many HEIs are shifting from traditional IT services to Clouds because it makes the academic process more efficient and effective. Cloud Computing offers huge benefits to HEIs such as boosts collaborative research activities, storage and backs up data, improves filling and 24/7 accessible facilities from remote locations, provides latest software and applications for financial and HR management, online learning management system, improves accountability and various services with minimum start-up cost. Besides the utmost benefits it offers for the HEIs, increasing financial pressure forces them to consider adopting CC because it reduces cost and pay-per-use pricing model. Globally researchers are showing interest in the adoption of CC in HEIs sector, but factors are still unexplored for Bangladeshi HEIs context. As a result, to fill this gap is required to identify influential factors, benefits and what challenges Bangladeshi HEIs face while adopting CC. Therefore, TAM and TOE theory is used to develop a conceptual model to identify influential factors for Bangladeshi HEIs.

Keywords: Cloud Computing, Information Technology, Higher Education Institutions, Technology Acceptance Model.

1. Introduction

Education process will become impossible in this smart world without the use of technological devices nowadays. Information Technology (IT) helps the educational institutions to speed up the learning process as well as encourage effective knowledge sharing with different parts of the world. Smart education and smart learning environment can really help smart learners to gather knowledge about different areas in this 21st century (Zhu et al., 2016).

Without any doubt, Higher Education Institutions (HEIs) are the focal points of developing the process of any country. In developing countries, more students are enrolled in HEIs in compare to the previous few years (Workineh et al., 2017). Therefore, HEIs need more importance and investment from different sectors of a country. Cloud Computing (CC) can make the digital learning environment for digital learners who will be in key positions of a country in the next few years. Implementation of CC in the learning process in HEIs is very much needed in developing countries (Hamzah et al., 2017; Alajmi et al., 2017). As a result, the country will get more smart ideas from the smart decision-makers of that country.

There are numerous benefits of adopting CC in HEIs for a country. Alajmi et al. (2017) had found that there is a positive impact of cloud-based education on the learning process and the CC will help to overcome the problems of the traditional learning process. Developing countries should emphasize cloud-based learning in HEIs to speed up the developing process.

HEIs are facing difficulties of sharing resources which indicates to implement a system like a cloud computing that can overcome the difficulties (Muhammad et al., 2012). There is very few research on CC regarding HEIs in Bangladesh. This paper will develop a conceptual model and integrated TAM and TOE models to identify influential factors for Bangladeshi HEIs.

2. Literature Review

There are two categories of theories to discuss and analyze the adoption process in IT. Theories deals with the individual adoption of IT like Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM) and etc. whereas another type of theories deals with organizational adoption of IT like technology organization and

environment (TOE), diffusion of innovation (DOI) theory, Resource-Based View (RBV), Fit-Viability Model (FVM) and many more. However, the organizational view of the adoption process is somewhat new in comparison to the individual view of the adoption process. Gangwar et al. (2015) had used the TOE theory as well as TAM theory to assess the adoption level at the organizational level. They used exploratory and confirmatory factor tools after collecting data from manufacturing, IT and finance companies in India. Mokhtar et al. (2016) used the questionnaire survey method to test TOE theory and proposed eight variables that can affect on the CC adoption process in HEIs. Alharthi et al. (2015) used the TAM model for the identification of factors affecting the behaviors and attitudes of the users regarding CC in ICT division of universities. AlAjmi et al. (2017) had tried two popular theories which are The Fit-Viability Model (FVM) and Diffusion of Innovation (DOI) to identify important factors of cloud computing (CC) implementation in HEIs. Workineh et al. (2017) had considered the resource-based view (RBV) theory and unleash capabilities of readiness and success of CC adoption in HEIs. Sultana et al. (2017) tried to explore factors of cloud computing adoption in HEI considering only the University of Dhaka.

However, these popular theories were used by many researchers to explore and uncover the factors of the adoption process of CC in HEIs. Researchers of different countries are showing interest in the adoption of CC in HEIs sector, but the factors are quite unexplored for Bangladeshi HEIs context. Though the specific theory has specific benefits, this paper has considered to integrated TAM and TOE theories to develop a conceptual model to identify influential factors for adopting CC in Bangladeshi HEIs.

3. Proposed A Conceptual Framework and Variable Definitions

Based on the previous studies, adoption of CC relevant variables is taken to propose a conceptual framework and their propositions.

3.1. Technological Readiness

Technological readiness is a process to assess whether an organization's existing infrastructure is suitable for adopting a new technology (Abdollahzadehgan et al., 2013; Mohammed and Ibrahim, 2013; Ahmadzada et al., 2016). Past literature suggests that appropriate IT

infrastructure, financial support, and knowledgeable human resources influence an organization's perception regarding cloud computing adoption positively (Gangwaret al., 2015).

Based on this assumption, the following propositions have been proposed:

P1a: (+) *Technological readiness has a positive effect on perceived usefulness to adopt CC in HEIs.*

P1b. (+) *Technological readiness has a positive effect on perceived ease of use to adopt CC in HEIs.*

3.2. Relative Advantage

According to Rogers (2003), relative advantages refer to the extent an organization perceives a new product or innovation to be of greater advantage in comparison with other innovations in the market. (Gutierrez et al., 2015) because it has many advantages over the technologies such as "accessibility" (Therese and Semalatha, 2018), "adaptability" (Rafiq, et al., 2017), "flexibility" (Attaran et al., 2017), "elasticity" (Olanrewaju et al., 2017), and "reliability" (Zameer, et al., 2017), "reduce cost" (Tariq et al., 2017) in order to make teaching, learning, collaborating, sharing and others. Based on this assumption, the following propositions have been proposed:

P2a: (+) *Relative advantage has a positive effect on perceived usefulness to adopt CC in HEIs.*

P2b: (+) *Relative advantage has a positive effect on perceived ease of use to adopt CC in HEIs.*

3.3. Complexity

As cloud computing adopting is new in HEIs, so it may seem to be challenging to use than the existing systems of organizations. Sometimes, if the installation of the new system is too complicated to use along with the past system, that demotivates the organizations to adopt the new system as well. In this regard, Rogers (20013) states that the adoption of innovation is

considered troublesome for an organization when it is challenging to use. Based on this assumption, the following propositions have been proposed:

P3a: (-) *Complexity has a negative effect on perceived usefulness to adopt CC in HEIs.*

P3b: (-) *Complexity has a negative effect on perceived ease of use to adopt CC in HEIs.*

3.4. Top Management Support

Top management support refers to decision-makers' support such as approve enough fund, human and technological supports. Oliveira et al., (2014) noted that top management support is important, and it ensures all the resources are available and overcome all the barriers and resistance to adopting new technology (Jang, 2010) and without top management support lead to the failure of new technology implementation (Grandon and Pearson, 2004). From the previous studies, top management support has been found to positively affect perceived usefulness and perceived ease of use in the adoption of CC. Based on this assumption, the following propositions have been proposed:

P4a: (+) *Top management support has a positive effect on perceived usefulness to adopt CC in HEIs.*

P4b: (+) *Top management support has a positive effect on perceived ease of use to adopt CC in HEIs.*

3.5. Training

Training is systematic teaching sessions for employees of an organization to acquire new knowledge or skill (Schillewaert et al., 2005). Before implementing cloud comping in an organization, HEIs employees must be trained well to use cloud computing-based applications. Such orientation to using new technology informs the users of its benefits and reduces techno-phobia (Gangwar et al., 2015). Moreover, training removes confusion from the employees' minds and increase their skills to use new technology in the future. Based on this assumption, the following propositions have been proposed:

P5a: (+) *Training has a positive effect on perceived usefulness to adopt CC in HEIs.*

P5b: (+) *Training has a positive effect on perceived ease of use to adopt CC in HEIs.*

3.6. Service Provider Support

In the case of implementing cloud computing in HEIs, the institutions will receive IT services from service providers. In order to choose an appropriate service provider, the HEIs will depend on how reliable the support services are in providing uninterrupted quality services. Moreover, their existing reputation in the market will also influence HEI's decision of collaborating with them. (Kumar et al., 2017). Service provider support will have a direct impact on PU and PEOU to adopt CC in HEIs. Based on this assumption, the following propositions have been proposed:

P6a: (+) *Cloud service provider has a positive effect on perceived usefulness to adopt CC in HEIs.*

P6b: (+) *Cloud service provider has a positive effect on perceived ease of use to adopt CC in HEIs.*

3.7. Government Policy

If the government of a country sets strict policies for adopting new technology, it affects the adoption of cloud computing in HEIs as well as in some countries, stringent tax policies (Pan and Jang, 2008), complicated laws and regulations (Alshamail et al., 2013) set by the government becomes an obstacle for adopting new technology. That is why government policy will have a direct impact on the adoption of cloud computing in HEIs as well. So, the following propositions are proposed:

P7: (-) *Government policy has a negative effect on the adoption of CC in HEIs.*

3.8. Perceived Usefulness

Perceived Usefulness (PU) refers to the beliefs that the users of cloud computing have regarding using cloud computing services in order to improve their performance in the workplace or HEIs. (Alharthi et al., 2015). So, the following propositions are proposed:

P8: (+) *Perceived usefulness has a positive effect on the adoption of CC in HEIs.*

3.9. Perceived Ease of Use

Perceived ease of use (PEOU) refers to the expectations the users of cloud computing may have regarding comfort level of adopting the new system (Davis, 1989). According to the TAM model, PEOU does affect PU because if the users find the new technology is easy to use, the perceived usefulness of the technology increases (Schillewaert et al., 2005). Based on this assumption, the following propositions have been proposed:

P9a: (+) *PEOU has a positive effect on perceived usefulness to adopt CC in HEIs.*

P9b: (+) *PEOU has a positive effect on the adoption of CC in HEIs.*

From the above discussion, we can draw the proposed conceptual framework

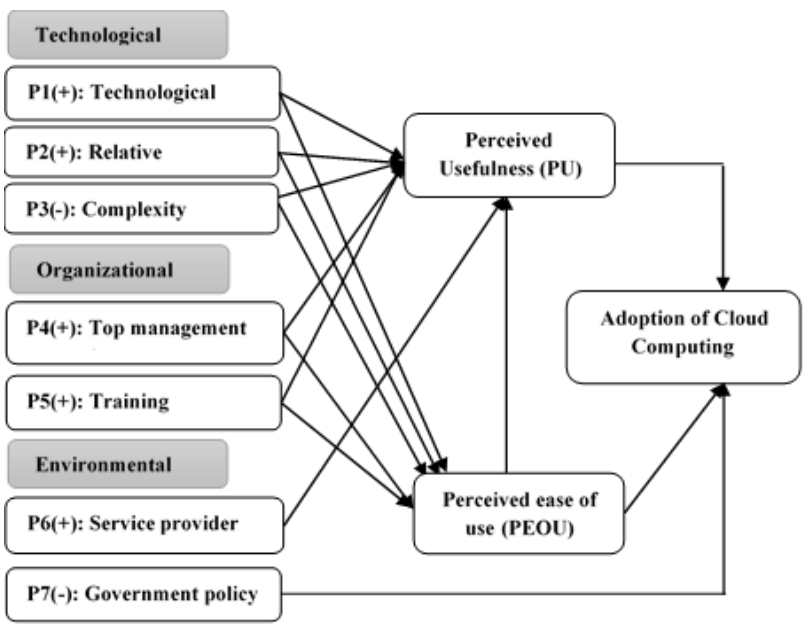

Figure 1: Proposed a Conceptual Framework Adoption of CC in HEIs in Bangladesh

4. Conclusion and Future Research

This paper discusses a conceptual model based on TAM and TOE at the pre-adoption stage by Bangladeshi HEIs. This model contributes towards identifying the factors influence of Cloud Computing in HEIs that are yet to adopt Cloud services. It is globally established that HEIs need to adopt Cloud services, not only for reducing cost but also makes more efficient and effective. Nevertheless, this model needs to be validated and will be tested in future studies.

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