

Factors Affecting the Decision of Adoption Cloud Computing Technology

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Abstract. This research is a review paper that aimed at reviewing the most recent researches in cloud computing adoption field to evaluate the most important factors that influence and affect the decision to adopt the cloud computing technology. cloud computing technology is considered as paradigm shift that will change the traditional way of delivering information technology services. though it is supposed to be as a revolutionary improvement information technology paradigm, the decision makers in the organizations and CEOs are still not fully opened to adopt cloud computing and the main concerns of this technology have not been fully identified. In this paper we reviewed studies that empirically investigated the main factors that are considered when adopt cloud computing technology. Two main models that were used in determining the factors affecting the decision to adopt cloud computing are Technology–Organization–Environment (TOE) framework and the technology acceptance model (TAM)

Keywords: cloud computing, information technology, information and communication service

1. Introduction

Cloud computing has been defined by U.S. NIST (National Institute of Standards and Technology) “Cloud computing is a model for enabling convenient, on demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction “ (Mell & Grance, 2011). Cloud computing provide a huge capabilities that could be an effective tool for the organizations which depend on information technology services in their daily processes. Nowadays information technology has a great impact on the productivity of firms. The cloud computing technology offers all the required functions of information technology, especially the cutting edge technology services and it enables notable cost reduction. However, Cloud computing is still coupled with uncertainty because it is new paradigm shift in information technology.

2. Background

2.1 Definition

There are many definitions of cloud computing because it represents a wide variety of modern technology and characteristics. Sometimes the definition depends on the perspective of the interest of the author. According to Vaquero et al. (2009) “Clouds are a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider by means of customized SLAs“. A broad definition by U.S. NIST (National Institute of Standards and Technology) “Cloud computing is a model for enabling

convenient, on demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” Other studies determine cloud computing as getting of information technology services from third party service provider rather than install it inside the firms (Behrend, et al.2011).

According to Ahokangas et al. (2014) and the aforementioned definitions we can summarize the main characteristics of this new technology as dynamic scalability, pay-per-use pricing, on-demand availability, and ubiquitous access and resource pooling.

2.2 Levels and models of cloud computing

According to Rimal et al. (2014) the three main cloud computing models are:

1. Software as a service: it is mainly provide the application itself to the organizations by the services provider
2. Platform as a service: make the platform of delivering the application required by business organizations available to the developers
3. Hardware as a service: instead of buying the hardware like data centers the services of the hardware are from the third party provider
4. Infrastructure as a service: when the network’s equipment and storage equipment become virtually available for the organizations by the services provider the three main cloud computing see above, here there are four!

Figure 1. Cloud layered architected by Rimal et al. (2014,45) .

Software-as-a Service (SaaS)
Platform-as-a-Service (PaaS) Developers implementing cloud applications
Infrastructure-as-a-Service (IaaS) [(Virtualization, Storage Network) as-a-Service]
Hardware-as-a-Service (IaaS)

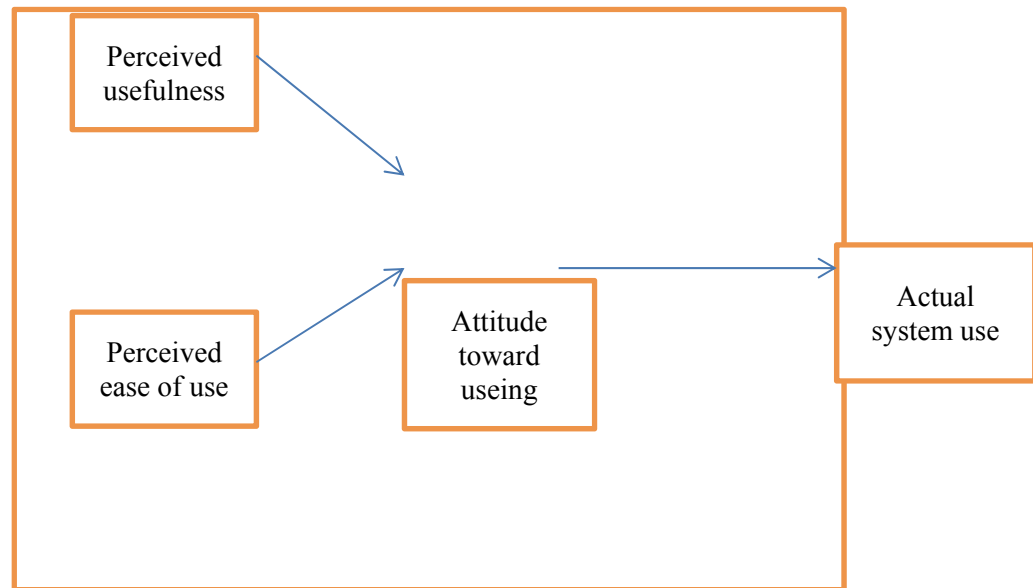
3. Factors affecting the decision of adoption cloud computing

3.1 Technology acceptance model (TAM)

Many studies have conducted to evaluate the factors that may affect the decision to adopt any new technology. One of the earliest models is technology acceptance model (TAM) that examines the factors that affect the adoption of the new technology. The model was firstly designed in 1986 to determine the attitudes of the users toward the new information systems. Two main variables were used to be the main determinants of the accepting of the system by the users, first one is perceived ease of use and the second one is perceived usefulness.

Perceived usefulness is referred to the extent to which a person assumes that utilizing IT will improve his/her performance at the job. While, perceived ease of use is referred to an extent to which an individual believes that adopting new IT system in his/her routine operations will require no additional efforts (Sentosa, Yang & Mat, 2012). The model also provides that external variables (such as, design characteristics) affect behavioral intention that is mediated by two variables, ‘perceived ease of use’ and ‘perceived usefulness.

Figure 2. Proposed TAM (Davis, 1985,24)



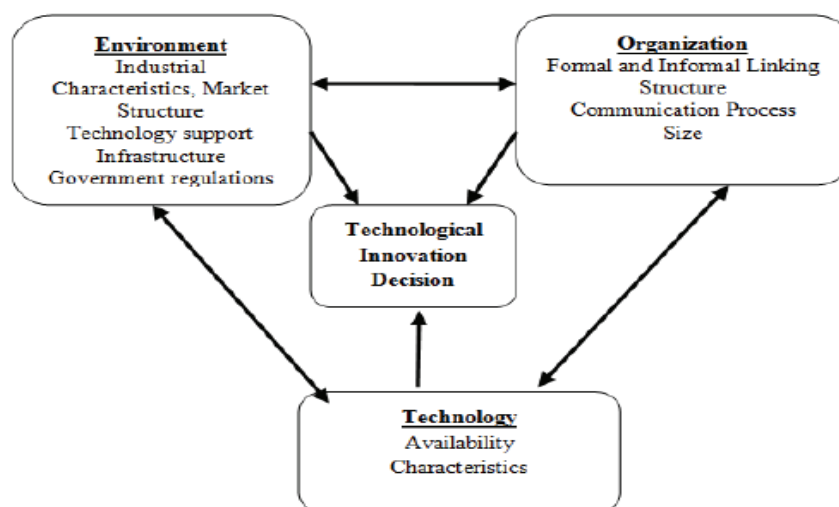
Later TAM model has been revised in order to get deep understanding of the perceived ease of use. Two factors, computer self-efficacy and objective usability were added (Venkatesh and Davis, 1996).

An empirical study conducted on German IT departments supported the impact of perceived usefulness on the adoption of the cloud computing technology (Opitz et al. 2012). The study of Yuvaraj , (2016) that examined the adopting of cloud computing in Indian libraries reveal that the key drivers for adopting cloud computing technology are the cost and ease of use.

3.2 Technology–Organization–Environment (TOE) framework

Another important model that used to determine the important factors affecting the decision of adoption cloud computing technology is Technology–Organization–Environment (TOE) framework.

Figure 3: TOE framework (Tornatzky and Fleischer , 1990)



In this model the factors that affect the adoption of the new technologies have been grouped into three categories, first one is the environment which is the factors outside the organization like the industrial characteristics, market structure. the second one is the characteristic of the organization itself like the size and structure. the last group the factors related to the technology that will be adopted like the availability and characteristics

This TOE framework is very suitable to consider as feasible for cloud computing adoption cloud computing adoption is a special case for the acceptance and diffusion of conventional innovation because usually third party provides the services of cloud computing to other business organizations who need it (Low, Chen & Wu, 2011).

An empirical study on Indian companies that conducted by combined the TOE model with TAM model proved that the competitive pressure and trading partner have affected the decision to adopt the cloud computing (Opitz et al. 2012)

3.3 Privacy and security

Privacy and security issues are the main challenges in information technology industry. As any new emerging advancement in information technology field the concerns about privacy and security at the top priorities of the customers who would adopt this technology. Some authors argued that the cloud computing is still associated with uncertainty and some risks but these risks will take time to be resolved so they suggest threshold strategy to estimate the risks and benefits of cloud computing comparing to traditional on site computing and they only shift to cloud computing partially in case the benefits exceeds the risks (Kantarcioglu, Bensoussan & Hoe, 2011).

Data security in some sectors come firstly to the mind of decision maker when they think about cloud computing, so protecting sensitive information is very important issue when offer cloud computing services to hospitals and healthcare organizations (Lian, Yen and Wang, 2014).

4. Conclusion

We mentioned the main possibilities and improvements that cloud computing can bring to the organizations like getting the cutting edge technology at lower cost. However there are many concerns and barriers still hinder the adoption of this technology. We shielded the light on the main models that used widely to assess the new technology acceptance and adoption. The technology acceptance model (TAM) and Technology–Organization–Environment (TOE) framework are the main models that have been tested many times in an empirical researches to figure out the factors that affect the adoption of cloud computing technology. We reviewed empirical studies that used TAM and TOE models and we found that factors like perceived ease of use, perceived usefulness and competitive pressures were the important drivers to adopt cloud computing technology. From other hand privacy and security issues are the main concerns that the decision makers in many organizations worry about especially in high sensitive information sectors like the health care sector. Future research should use the factors we mentioned and test it empirically.

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