

# TECHNOLOGICAL FACTORS INFLUENCING THE ADOPTION INTENTIONS OF PUBLIC CLOUD COMPUTING BY THE PRIVATE SECTOR FIRMS

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**Abstract-** Cloud computing is an evolving term these days. It describes the advance of many existing IT technologies and separates application and information resources from the underlying infrastructure. The main objective of this research is to identify the technological factors influencing the intentions to adopt the public computing by the private sector firms. The four technological factors influence in the cloud computing adoption is examined in this research by using a proposed integrated model. The model incorporates aspects of the Technological factors such as Complexity, Compatibility, Security Concerns and Trialability. In order to test influencing technological factors a study was done and one hundred and twenty two valid responses were received from IT decision makers from forty firms in different industries. The results revealed that the Compatibility and Trialability are the main influential factors in the adoption intentions of public cloud computing. Future research could be built on this study by developing different model for each industry because each industry has unique characteristics that can influence the adoption of the technological innovations.

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**Keywords-** cloud computing, virtualization, security, Compatibility, Complexity, Trialability

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## I. INTRODUCTION

Due to the intense market competition and a rapidly changing business environment, firms have driven to adopt various modern information technologies in order to improve their business operations and increasing their productivity. Since the private sector firms in any country are important players in each industry which significantly contribute to the economy's Gross domestic product and labor force, it is important to propose new strategies and technologies that can help the private sector firms to become more efficient and effective [1]. The high cost of computing technologies is due to complex information architecture and infrastructure, and that will discourage the firms from adopting advanced IT services. Based on that, one approach that helps the firms to enhance the productivity and being efficient is to invest in public cloud computing [2]. Cloud computing offers several benefits for enterprises. The cloud frees organizations from having to set up an IT infrastructure and allows them to rent resources and pay only for the services they use [3] [4]. Yet, the emergence of cloud computing solves this problem by reducing direct expenses of information technology.

For many firms, the adoption of public cloud computing became more beneficial as it can quickly add more capabilities to their IT systems without investing in new expensive infrastructure, buying or deploying new application systems, or training new IT personnel [5][6]. The concerns related to the clients' data privacy and protection, problems with data separation in the cloud and long-term viability of the public cloud provider can negatively affect the firms' willingness to adopt the public cloud

computing [8]. For the firms in non-IT-centric industries such as banking and finance, manufacturing and retail & wholesale trade, the perceived risks are often high to invest in recently emergence technology that has not yet reached the maturity level or doesn't satisfy the industry-specific compliance. [7] Accordingly, these firms are mostly reluctant to adopt the public cloud services. Despite their importance, limited research has studied the adoption, implementation and usage of the cloud computing in the private sector firms in the Gulf Cooperation Council (GCC) countries. According to that, this research studied the factors that influence the adoption intentions of public cloud computing by the IT decision makers in the private sector firms. In brief, the research aims to spot the light to the adoption intentions of cloud computing in a wide range of private sector firms from different industries, as well as contributing to the body of knowledge related to the factors of adoption.

## II. ETHODOLOGY

Cloud computing model is composed of three service models Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) and four deployment models Public, Private, Community and Hybrid. A third party service provider, stores & maintains data, application or infrastructure of Cloud user. Relinquishing the control over data and application poses challenges of security, performance, availability and privacy. Public Cloud Computing is one of the emerging areas in the field of information technology and has been considered as a hot-growth area based on its potential benefits. Cloud computing is considered

in the second place after business intelligent on the list of the top five most influential technologies. However, despite the fact that the adoption of public cloud computing has been growing, its rate of acceptance remains practically very low in the developing countries to about 37% , and the rate expected to be even lower in the less developed countries as the case with most of the technological innovations.[12] Therefore, it is important to investigate the factors that affect the adoption intentions of public cloud computing by IT decision makers in the private sector firms in developing countries. The diagram below is a model proposed model to identify the technological factors influencing the public cloud adoption in the private sectors [11]. The factors influence in the cloud computing adoption is examined in this research is using the proposed integrated model incorporates aspects of the Technological factors such as Complexity, Compatibility, Security Concerns and Trialability[9] [10].

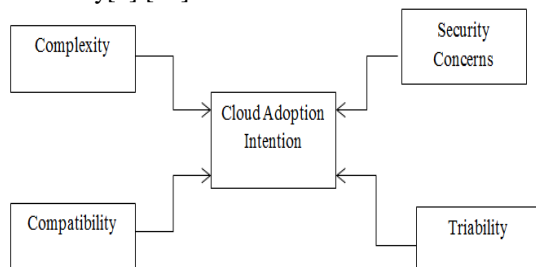


Figure 1: Technological Factors influencing Cloud Adoption Intention

The main question of this research is “What are the technological factors that influence the intentions in adopting public cloud computing in the private sector firms ?” with the following main objectives.

- analyze the technological factors influencing the IT decision maker intentions to adopt public cloud computing in the private sector.
- provide suggestions and recommendations for the firms and the service providers in order to increase the adoption rate of public cloud computing between the firms in the private sector.

The targeted population in this research is defined as “managers and professionals who are involved in the decision process for the adoption of a new information technology in large firms in the private sector”.[13]As part of this research the researcher measured the degree of satisfactions in the firms those have already adopted the cloud services. A list of 30 firms preferably known as leader firms in different industries have selected as the target population.[14][15] The senior personal of the IT department in these firms were contacted to in identifying the relevant hypothetical respondents for this survey within their firms as the targeted sample. An online questionnaire survey was conducted among the participants.

### III. ATA ANALYSIS

#### Respondents’ Profile:

All the participants in this research are IT decision makers who are familiar with public cloud computing. The majority of the respondents were system administrators (22%), Information Technology Managers (18%), heads of IT departments (13%) and senior software developers (11%). In addition to the participants’ job titles, the type of industry in which the firms conducted their business was also captured. Figure 2 indicates that the participants mostly came from four main industries: Banking, Finance and Insurance (21%), Telecommunications (19%), Industrial Manufacturing (15%) and Information Technology (11%).

In terms of the respondents’ profile, the collected data indicated that 76% of the respondents were not adopting public cloud computing services in their firms, while 29 % were already adopting.

#### Complexity:

To measure this construct, the respondents first were asked whether they think that the work with cloud computing requires complex IT skills (Complexity\_1); whether it is difficult to integrate the cloud based services with their current IT Infrastructure (Complexity\_2); and whether it takes too long to learn how to administer and monitor the Cloud computing services (Complexity\_3). As shown in Figure 5, only 27% of the respondents agreed with the fact that the work with cloud computing is complicated and about 26% agreed that the integration between their current IT infrastructure and cloud based services is difficult. At last, about 19% of the respondents agreed with the fact that administrating and monitoring the cloud based services are complex tasks. Table 2 summarizes the descriptive analysis of complexity.

Questions	N	Mean	Std. Deviaion
Complexity_1	122	2.7704	1.1483
Complexity_2	122	2.7049	1.0577
Complexity_3	122	2.5573	1.0836

Table 1: Descriptive Analysis of Complexity

#### Compatibility:

Using three questions, this construct measures the degree to which cloud computing is perceived as consistent with the existing infrastructure, culture and previous practices of the firms. As it can be viewed in Figure 6, about 66% of respondents think that cloud computing is compatible with the business model of their firms (Compatibility\_1). More than 60% agreed that the adoption of cloud computing is compatible with the norms and culture of their firms (Compatibility\_2). About 61% think that cloud computing is compatible with their current IT infrastructure (Compatibility\_3). Table 3 summarizes

the descriptive analysis of three questions related to the compatibility factor.

Questions	N	Mean	Std. Deviaion
Compatibility_1	122	3.5901	0.8307
Compatibility_2	122	3.5245	0.9976
Compatibility_3	122	3.5245	1.0849

**Table 2: Descriptive Analysis Compatibility**

### Security Concerns:

Table 4 summarizes the descriptive analysis of three questions related to the security concerns of public cloud computing. As shown in Figure 7, 46% of respondents think that it is unsecured to keep their business data in the Cloud providers' data center (Security Concerns \_1). About 41% claim that it is unsecured to use the cloud services over the internet to conduct their business' operations (Security Concerns \_2), and 38.5% claim that the cloud computing concept does not satisfy their firms' security and privacy policies (Security Concerns \_3).

Questions	N	Mean	Std. Deviaion
Security Concerns_1	122	3.1557	1.3237
Security Concerns_2	122	3.0573	1.3255
Security Concerns_3	122	3.0491	1.2388

**Table 3: Descriptive Analysis of the Perceived Security concerns**

### Trialability:

Table 6 summarizes the descriptive analysis of the participants' opinions about trialability provided by the public cloud providers. As shown in Figure 9, more than 70% of the participants think that before taking the adoption decision they will have the opportunity to use cloud computing services on a trial basis (Triability \_1) and run partial integration test between the cloud applications and their existing system (Triability \_2). Also, about 58% agreed that the cloud providers offer their services on a trial basis long enough to prove the platform capabilities and benefits (Triability \_3).

Questions	N	Mean	Std. Deviaion
Triability_1	122	3.97541	0.87634774
Triability_2	122	3.868852	0.83270762
Triability_3	122	3.606557	0.92314032

**Table 4: Descriptive Analysis of the Perceived Trialability**

## CONCLUSION

This research tries to increase the theoretical background about public cloud computing adoption in the private sector firms in the developing countries from different points of views by adopting a holistic framework that incorporates Technological factors to examine the intentions adoption of cloud computing.

According to the findings, there was no agreement between the participants on whether to consider the public cloud computing as secure or not. This resulted from the fact that the cloud computing concept still needs more time in order to prove its security capabilities and benefits to firms. Accordingly, when the firm is willing to adopt public cloud computing, it is better to start with services that do not mandates storing the critical business data in the provider's storage such as Virtual PBX phone service, Desktop as a Service, and Microsoft Office 365. This will help the firm to be more knowledgeable about the capabilities exist within the cloud computing before implementing critical services such as ERP and CRM.

In order to be prepared for cloud computing, it is essential for the firm to optimize its network by installing intelligent load balancers in their infrastructure. [14] Those devices allow the firm to manage, redirect and priorities the network traffic belong to mission-critical cloud applications when their bandwidth is under pressure, as well as allowing to scale up capacity over peak times. On the other hand, the cloud providers need to be aware of the concerns that firms experience when they make their adoption decision, such as cost saving, trialability and external support. In addition, the service provider must arrange their services in order to be experimental. Giving the opportunity for the firms to try the services in experimental environment long enough to prove the platform capabilities and concept which more likely result an increase in the adoption rate.

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