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# Investigating the Determinants Of CC-SaaS Adoption in Public Organizations: Results from Preliminary Study

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**Abstract**

***Recently, the utilization of Software as a Service (SaaS) by public organizations for sourcing software applications has led to reduced costs and improved quality of existing operations. Many studies have investigated the influential factors for cloud computing (CC) adoption in developed countries in the extant literature. However, studies have investigated the adoption of CC-SaaS in a developing country, especially in an unstable country like Iraq is sparse. Therefore, the main objective of this study is to conduct a pilot study on the factors affecting public organization intention towards the adoption of CC-SaaS in Iraq. The obtained result indicates that the normality of data in this study falls between -0.49 to 1.50, the recommended range of -/+2. Also, the reliability analysis result for the constructs is above the established benchmark of 0.60 of Cronbach's alpha, indicating that the data is reliable and normally distributed.***

**Keywords**: *Cloud Computing, Software as a Service, TOE, DOI, and HOT-Fit*

## 1 Introduction

Cloud computing has been recognized as a critical next-generation computer model[1], attracting researchers' attention in academic and economic fields. The National Institute of Standards and Technology (NIST) has described cloud computing as a model that allows for seamless, on-demand network access to a pool of shared configurable computing applications [2]. Three important cloud service models exist. The first is Infrastructure as a Service (IaaS), which allows data processing and storage equipment to be outsourced. The second is Platform as a Service (PaaS), which provides developers with a cloud platform to build services

and applications. The last is Software as a Service (SaaS), through which users access applications via a browser as a substitute for the installation of software on their computers. SaaS also provides configuration and hosting that is highly centralized and enables automatic updates [3]; it relieves users from installing and maintaining software and allows them simple access via the Internet [4]. Cloud computing offered several benefits to organisations, including the soft initial cost of investment, services scalability, and more importantly, on-demand resources [3], enables users to save more from operational cost [5], facilitates noncomplex utilization of cloud-based solutions [1], enables the efficient provision of services, budget management, and effective service delivery [6]. Despite these benefits, the literature reveals some difficulties and obstacles which organizations experience in the adoption of SaaS. Therefore, the current study tend to construct a study model with the help of CC adoption literature through the careful selection of variables from three theoretical models that have been shown to be relevant by prior studies. The rest of this article is divided into sections and sub-parts as needed., thus, after the introductory section, rior studies on CC-SaaS are provided in section two. Section three review mainly on the theoretical background of IS models used for the studies of CC adoption. Technological dimension of the proposed model and study measurement, demographic and the normality of the study data are presented in Section four and five respectively. The result analysis are presented for data normality, reliability and factor analysis in Section six, then the conclusion of the paper at the last section.

# 2 Theoretical Background

The conceptual model (CM) of this study is developed based on concepts derived from renowned IT theories, including the Diffusion of Innovation (DOI) Theory, Human, Organisation, Technology (HOT), and Technology, Organisation, Environment (TOE) Framework. DOI was initially developed by Rogers (1962); it was built based on the notion that organizations adopt new ideas, and those ideas influence the change within such organizations. Through DOI, Rogers (1962) proposed five essential factors influencing the adoption of new ideas: compatibility, complexity, observability, relative advantage, and trialability [5]. In the case of the TOE framework, it was proposed by Tornatzky and Fleischer (1990) through an investigation into the adoption of innovation at the organisational level [6], [7], the study eventually produced a framework that offers a holistic picture of critical factors that affect technology adoption [7], [8]. In specifics, the TOE classified the factors that influence the adoption of technology among organisations into three categories, namely, organizational context, technological context, and environmental context [8]. The HOT-fit model was developed through a study undertaken by Yusof et al.[7]. Its development was based on the application, extension, and combination of variables within the IS success model [8] and those within the IT Organisation Fit model, concentrating on HOT variables and their Fit. In essence, the HOT-fit model came up with a comprehensive model that combined

technological, organisational, and human factors. Thus, it postulates that among the factors that could significantly positively affect technology adoption are user attitude and competencies [7], [9]. Interestingly, several studies that validated the framework confirmed that it is useful in explaining the relationship and alignments that subsists between HOT and system performance-related problems. Several research efforts have been undertaken to identify the potential factors that affect the adoption of new technology and the relationship between these factors and technology adoption [7]. Theses studies have deployed outsourcing theories in the investigation of cloud adoption [10]. Equally, in numerous studies, technology adoption theories have also been applied in supporting the research into CC adoption [9], [11]. In this paper, DOI, TOE, and HOT-fit models are deployed to support this study's framework, which focuses on the CC-SaaS adoption. Through the literature review on the adoption of CC-SaaS, twelve (12) factors were identified using the procedure suggested by Wymer and Regan [12]; the selection was made based on how frequent the factors appear in the extant literature. The following section of the research presented the research methodology.

# 3 Research methodology

## 3.1 Study model

In developing the CM proposed in this study, a multi-perspective theoretical framework was applied through three models; TOE, DOI, and HOT-Fit that integrate twelve independent, three mediating, and a moderating, which is used to determine the dependent variable. Figure 1 presents the research model of this paper.

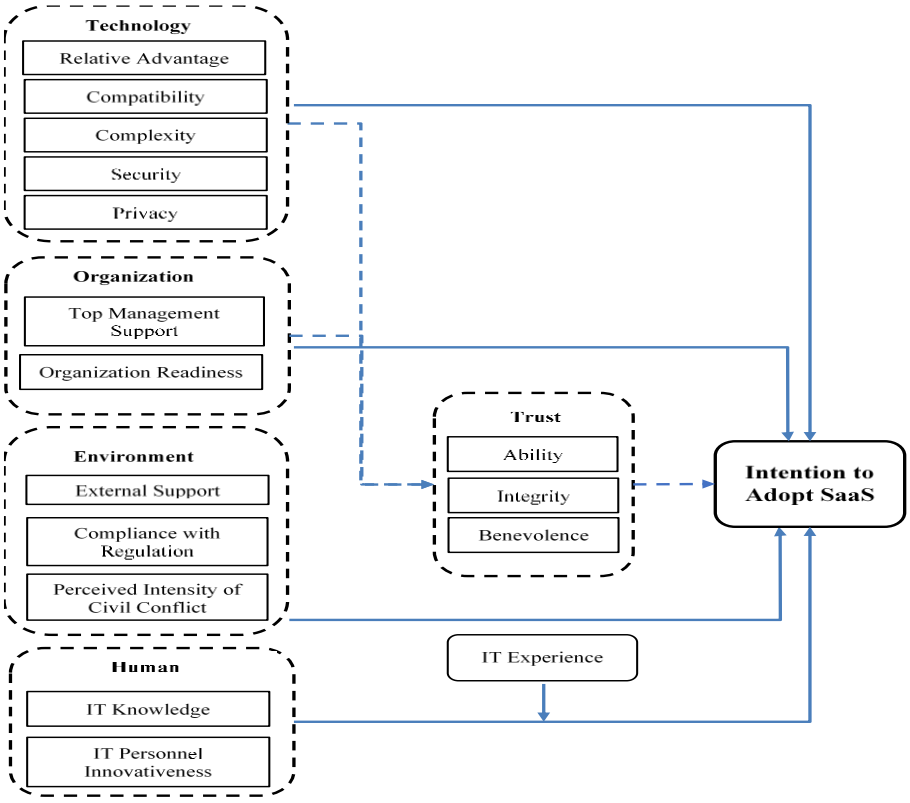


Figure 1.The Proposed Model of CC-SaaS Intention to Adopt

As depicted in figure2, the proposed model is conceptualized in four-dimension technology, organization, environment, and human. The study supposes that these dimensions will affect the Iraqi public organisation's decisions toward adopting CC-SaaS. The subsequent subsections explain the conceptualization of the proposed model as a foundation for adopting CC-SaaS in the Iraqi public organisation.

### A. The Technology Dimensions

Technological Dimensions (TD) have been considered in this study as technological factors that influence the intention of the organisation towards the adoption of CC-SaaS technology [13]. Five (5) technological factors have been identified in this study which is classified as a technological dimension used to measure its influence on adopting CC-SaaS. These include relative advantage, compatibility, complexity, security, and privacy. Hence, the influence of these factors on CC-SaaS adoption would be investigated in an unstable environment such as Iraqi,

### B. The Organizational Dimensions

The second dimension proposed in the model is Organisational Dimensions (OD), which can be described in terms of resource management provisions, specification

of goal, and decision-makers commitments, which eventually impact the adoption of the SaaS-based CC [13]. Organizational dimensions have been classified into two (2) categories to estimate their influence on adopting CC-SaaS. These dimensions are Top Management Support in the adoption of CC-SaaS and the Organisational Readiness towards CC-SaaS adoption. Hence, the impact of these factors on CC-SaaS adoption would be investigated in an unstable environment such as Iraqi.

**C. The Environmental Dimensions**

The third dimension is the Environment Dimension (ED), which is recognized as the external factor influencing the intention towards adopting CC-SaaS technology [13]. Therefore, this study identifies three (3) important factors composed as the environmental dimension, which are used in investigating its influence on the intention to adopt CC-SaaS. These are external support, compliance with the regulation as well as perceived intensity for civil conflict. Hence, the need to investigate the influence of these factors on CC-SaaS adoption in an unstable environment such as Iraqi.

**D. The Human Dimension**

The fourth is the Human Dimension (HD), which is considered as those human factors that influence the intention of an organisation towards CC-SaaS technology adoption [14], [15]. Two (2) human factors have been recognized in this study under this dimension. It is used to measure its influence on adopting CC-SaaS in an unstable environment as Iraqi. These include IT Knowledge of the managers and IT personnel Innovativeness.

**E. Trust**

Trust dimension has been identified as a mediating variable proposed to mediate the relationship between the three characteristics (technological, environmental, and human dimensions) and the intention to adopt CC-SaaS. Therefore, the three dimensions of trust, ability, integrity, and benevolence were absorbed in introducing a mediator. In this study, trust is considered as the level of confidence possessed by the users about the reliability of CC-SaaS providers and the functionality of SaaS-based systems [16]. Trust is part of the security issues in CC alongside other security concerns such as authentication and authorization, availability, integrity, and confidentiality [17]. Trust covers a broad spectrum of issues; it is far beyond just the trust in the cloud provider; it encompasses the trust of the technology itself as well as `capabilities in the provision of quality service and the absence of loss of data or interruption in the process of providing the service. Thus, considering the scope of trust in covering a wide spectrum of critical issues to organizational decision-makers, it is expected that they will require a certain level of assurance [18]. Therefore, this study's trust will be operationalized using its three essential dimensions, covering ability, integrity, and benevolence [19].

It can be argued that when CC-SaaS is perceived as compatible with other installed technologies in the organisation, such an organisation would be more likely to have the ability to use the system and eventually develop intention towards its adoption. Similarly, when CC-SaaS is also perceived to be complex, the organisation will develop the ability to cope with difficult challenges in its usage; thus, it will eventually trigger intention towards adopting CC-SaaS when such ability is set. Moreover, when security and privacy are perceived concerning the CC-SaaS, it may create a perception of integrity for the CC-SaaS, which will motivate organizations to develop intention towards its adoption.

**F. IT Experience**

IT experience is considered the degree of a user's experience regarding CC-SaaS technologies or previous similar technologies [20]. In this study, the experience is proposed to moderate the relationship between the human dimension (IT Knowledge and IT Personnel Innovativeness) and intention towards CC-SaaS adoption. This is because the IT experience is attached to humans or personnel within the organisation. Hence, there is the likelihood to interact with the human factors in explaining intention to adopt CC-SaaS.

## 3.2 Study Measurement

A questionnaire was prepared to analyze the proposed model, which aims to understand the factors influencing CC-SaaS adoption at the organisation level for which various Iraqi ministries were used for this study. For achieving these, all the items used in measuring the variables were adapted from previous studies. Furthermore, the validation of the construct's reliability become highly imperative, the essence is to avoid any potential problem that could arise due to differences in the context and scope of the study [21].

## 3.3 Normality of the Study Data

While the pilot study's main purpose is to guarantee the study instrument's reliability and validity to reduce the errors, improve the response rate, and provide a valuable and beneficial inquiry [22]. Thus, evaluation of the normality of data has been considered as one of the important statistical tests undertaken while conducting a pilot study [23], which has been defined by Hair [23] as the "degree to which the distribution of the sample data corresponds to a normal distribution." The normality of data for this study was cheeked through the use of Skewness and Kurtosis values to measure the distribution of data normality for each factor. Skewness is used to assess the data's symmetric distribution, while Kurtosis is applied to evaluate the peakness or flatness of a normal distribution [23]. Whereas the values of Skewness and Kurtosis are used to determine the normality of the data [23], the threshold values for the response should be within the range of -/+2 for

data to be considered as normally distributed [24]. Table 1. shows the Skewness and Kurtosis for each construct.

Table 1. Skewness and Kurtosis Values for Pilot Data

| Variables | Skewness | Kurtosis | Variables | Skewness | Kurtosis |
|---|---|---|---|---|---|
| RA | -0.13 | 0.47 | PICC | 0.30 | -0.13 |
| CM | -0.24 | 0.15 | ITK | 0.31 | -0.37 |
| CMx | 0.30 | -0.15 | IPI | 0.17 | -0.42 |
| Sec | -0.42 | -0.13 | ITE | -0.85 | 1.32 |
| Pri | -0.20 | -0.15 | Abi | -0.63 | 1.50 |
| TMS | -0.85 | 1.16 | Int | -0.68 | 1.24 |
| OR | -0.47 | -0.27 | Ben | -0.04 | -0.32 |
| ES | -0.37 | 0.26 | IASaaS | -0.94 | 1.10 |
| CR | -0.05 | 0.06 | | | |

The obtained result of Skewness and Kurtosis for all constructs in this study falls between -0.49 to 1.50. Thus, it indicates that all the result is adequate and within the recommended range of -/+2 and the data is normally distributed and reliable.

## 3.5 The Study Reliability Results

Reliability is generally referred to as the consistency and stability of the research instrument. It measures the extent to which it is free from random error, and it is usually indicated using reliability and internal consistency [25]. Internal consistency refers to the degree to which measurement items measure the same characteristic that it is expected to measure; it is commonly computed using Cronbach's Alpha (α) [25]. Further, Sekaran [26] asserted that the researchers in measuring construct reliability deploy several methods. However, the most common method deployed within the social sciences is Cronbach's alpha coefficient method. Consequently, Cronbach's alpha method is applied in this study to evaluate the instrument's internal consistency.

As mentioned above, considering that α was widely applied to calculate the data's internal consistency, it is evaluated based on a standard range of 0 to 1, where a higher value indicates higher levels of internal consistency reliability [25]. Based on this, Hair et al. [27] recommended an α value of 0.6 to 0.7 as acceptable. In contrast, any variable with a value below the recommended threshold lacks internal consistency reliability. Further, where poor reliability is reported concerning a particular construct, then an item with a corrected-item value of less than 0.3 of the total correlation should be deleted [28]; the essence is to improve the reliability construct. Based on this recommendation, two items were eliminated from the questionnaire, (Sec1) from Security and (Pri1) from Privacy constructs. Finally, the instrument reliability was tested using the Statistical Package for Social Science (SPSS), and the result is illustrated in Table 2.

Table 2. Result of Reliability Analysis

| Constructs | Items | Alpha Cronbach | Constructs | Items | Alpha Cronbach |
|---|---|---|---|---|---|
| RA | 5 | .787 | PICC | 5 | .790 |
| CM | 5 | .735 | ITK | 4 | .888 |
| CMx | 5 | .804 | IPI | 5 | .812 |
| Sec | 4 | .804 | ITE | 3 | .736 |
| Pri | 4 | .684 | Abi | 5 | .869 |
| TMS | 5 | .915 | Int | 5 | .935 |
| OR | 4 | .897 | Ben | 5 | .889 |
| ES | 4 | .849 | IASaaS | 5 | .926 |
| CR | 5 | .847 | | | |

The reliability analysis results from the above table indicate that the level of Cronbach's alpha was all above the established benchmark of 0.60, and none of the values was under the benchmark. Consequently, all the constructs consider reliable and sufficient for the study.

# 4. Conclusion

The rapid increase in the costs of using information technology and data growth among organizations has made CC-SaaS adoption an issue of strategic importance through which organisations can gain higher-order innovational benefits from the system. Therefore, CC-SaaS's adoption has become an issue of utmost importance and a major challenge that every organisation must face to coordinate its IT departments for their operations. Thus, to ensure optimal benefits are obtained from the utilization of CC-SaaS, the organization's capacity and the propensity of the organisation should be increased to identify and acquire external knowledge (which are numerous and evolve continuously from the CC-SaaS offerings together with extensive functionality provided by each of those offerings). This will enable organizations to assimilate this knowledge, merge it to their existing knowledge (relating to internal operations and planned innovations), and apply it to explore high value for the business using SaaS. Furthermore, considering that the application of CC-SaaS offered a great advantage to the organisation in many forms, including cost-effectiveness and increased pace of operation, companies that explore such processes should be required to follow laid-down rules and guidelines such as the evaluation of all the necessary criteria that will affect the adoption process from both positive or negative perspectives.

Consequently, this study proposed CC-SaaS intention to adopt the model through the combination of TOE, DOI, and HOT, which is considered highly robust due to incorporating widely important factors. The proposed model is tested for normality, reliability, and construct validity. The normality tested the degree to which the distribution of the sample data corresponds to a normal distribution; the result obtained for the normality of data in this study falls between -0.49 to 1.50, the recommended range of -/+2, that is cheeked through the use of Skewness and

Kurtosis values to measure the distribution of data normality for each factor. The reliability analysis also checked the internal consistency for the degree to which measurement items measure the same characteristic that it is expected to measure. It is commonly computed using Cronbach's Alpha (α). The result found for the reliability of constructs is above the established benchmark of 0.60 of Cronbach's alpha, indicating that the data is reliable and normally distributed.

This research shows that the adoption of CC-SaaS in fragile countries like Iraq will represent an excellent opportunity for Iraqi organizations to enhance performance, reduce cost, increase agility and flexibility, and focus on their core work instead of expanding resources, infrastructure, and maintenance. The results from the pilot study of the model indicate that the proposed framework and combined constructs present important considerations to the decision-makers, which will enable companies to undertake a safe and smooth and transition to CC adoption, and as well to likely minimize the risk resulting from dependency on the CC providers.

# 6. Future Work

This study will be extended by assessing several processes by evaluating the measurement and the structural model through the utilization of PLS-SEM to verify the model. In the measurement model assessment, the reliability and validity of the constructs will be examined. And the structural model assessment will aim to verify the model hypothesis.

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