

Investigating the Determinants of CC-SaaS Adoption in Iraqi's Public Organisations From the Perspective of IT Professionals

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Abstract

The public sector of Iraq has been struggling from a poor management of resources, infrastructure problems, the rising quantity of data, and difficulties that affect its governmental organisation's development, such as financial issues resulting from corruption and insecurity, the availability of IT resources, and infrastructure. Thus, cloud computing Software as a Service (CC-SaaS) can be a useful solution to help the governmental organisations to increase their service efficiency through the adoption of technology with low cost, and provide better e-services for the satisfaction of citizens as well as gain more benefit through information sharing. The adoption of CC-SaaS is not yet widespread in Iraqi public organisations due to numerous challenges, including privacy and protection, legal policy, and trust. In the extant literature, many studies have been published that investigate the factors affecting cloud computing (CC) adoption; however, most of these studies are from developed countries. Specifically, there is a scant study that investigates the adoption of CC-SaaS, especially in unstable developing countries; hence, this makes decision-makers unclear about the ample benefits of SaaS. In fact, in countries with dangerous and conflict areas, little is known about CC-SaaS's adoption. Therefore, this study's objective is to conduct a study on the factors affecting organizational intention towards the adoption of CC-SaaS in Iraq, a country rife with conflict. Thus, it necessitates the effort to examine the effect the conflict in Iraq could contribute to the country's CC-SaaS adoption. Eventually, it is expected to benefit not only the public organization in Iraqi but also validates the measurements for further study. Thus, the study model was developed on the basis of TOE, DOI, and HOT, and the variables were identify based on the expert's opinion. Data were collected from a sample of 367 IT professionals working in six Iraqi ministries. The collected data were analyzed by using the PLS-SEM approach. The obtained results showed that the effects of technology, organisation, averment, and human variables were statistically significant. Further, External Support and Compliance with Regulation were found not supported.

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

1. INTRODUCTION

Cloud computing (CC) has been seen as an important next-generation computing model [1], which in recent times has attracted much researchers' attention in both academic and economic fields. The National Institute of Standards and Technology (NIST) has defined CC as a model that enables convenient, 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), enabling outsourcing of data processing and storage equipment. The second is Platform as a Service (PaaS), through which developers are provided with a cloud platform that creates 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 the installation and maintenance of 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]. It also facilitates capital outlay reduction as well as the reduction in IT-related cost of operations and maintenance so that excess resources should be redirected towards other topical activities [7]. Despite these benefits, the literature reveals some difficulties and obstacles which organizations experience in the adoption of SaaS, especially when trying to match the speed in the advancement of technology regarding taciturnity with respect to the information security and protection against nonauthorized access [8], the lack of awareness regarding the capabilities of service providers with respect to privacy [9], disagreement between the cloud provider and organization regarding the scope of service and its implementation modality [10], financing problems, technical barriers and insufficient technical capabilities [11]. Following the above benefits and challenges, this study tends to examine the factors influencing CC-SaaS adoption among

public organizations. Several studies have been undertaken within the extant literature that investigate the application of CC in different domains, covering technical issues especially with respect to infrastructure security via new proposed architectures and methods [1], data management efficiency [1], measurement criteria for quality of service and performance [12] as well as other issues associated with interoperability standards especially as it relates to the difficulty in its integration and customization [13]. Additionally, the study's central contribution relates to business management issues, including cloud computing related opportunities, risk, and costs [14].

Nevertheless, the discussion in the subsequent section will uncover the fact that research directly related to CC-SaaS adoption in public organizations is lacking especially within unstable countries. Consequently, the decision-making process in the adoption of these services is often not straightforward, and, thus, several factors exist which organisation mostly takes into account prior to their decision. Therefore, the current study tends to develop a research model with the support of CC adoption literature through the combination of variables carefully selected from three theoretical models which have been proven to be relevant by previous research. The rest of the paper is organized in sections and sub-sections where necessary, thus, after the introductory section, prior 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 methodology, of the study data are presented in Section five. The discussion is presented in Section six, then the conclusion of the paper at the last section.

2. RELATED STUDIES ON SAAS ADOPTION

Notwithstanding that several studies were documented in the literature that addressed the current trends in the development of cloud services, only a few studies were found to have a specific focus on CC-SaaS adoption [15]. The majority of the documented evidence within CC-SaaS literature emphasized on outsourcing [16] or Application Service Provider (ASP) [17]. Among the studies that focus on CC-SaaS, several theories and models within the IS field were deployed to estimate the significant or insignificant determinants of its adoption. Some of these theories and models include, for or example, the study of Lee, Chae, and Cho [18] employed the PEST (political, economic, social, and technological) analysis, in the same vein, it confirmed economic factors as the significant factors deriving the adoption of CC-SaaS. However, PEST analysis failed to give due cognizance to the organisation's internal environment [19]. And in the study conducted by Wu [15], TAM was extended through the integration of security and trust; the result from the study

revealed that perceived usefulness, social influence, trust, and security are the significant determinants of CC-SaaS use, though the study of [15] focussed mainly on user (individual) acceptance of CC-SaaS. In another research conducted through a case study, Wu [20] explored the influence of risks and benefits perceptions on the adoption of CC-SaaS via the Decision Making Trial and Evaluation Laboratory (DEMATEL) approach. The outcome of this research suggested that the strategic interests of CC-SaaS adoption outweigh its associated risks. Nevertheless, the study did not explore the important factors relating to technology, organisation, and environment that can affect the adoption of CC-SaaS.

Besides, the adoption of CC-SaaS and ranking the determinants was conducted by Safari [21] to provide an insight about SaaS adoption in IT enterprises. The study developed a model using DOI and TOE for the determination of the influencing factors for CC-SaaS adoption. In addition, Erisman [22] used DOI and TOE to study the factors influencing CC-SaaS adoption in the SME manufacturing industry; a study by Mangula [23] was also conducted to discover the influence of technological, organisational, and environmental factors for CC-SaaS adoption in Indonesian companies. CC adoption factors are assessed for industrial and services sectors using DOI and TOE with only technological readiness as a factor [24]. Moreover, an online business study is conducted for SaaS adoption in Sri Lanka [4]. The study targeted managerial and ICT professionals that have technical know-how about SaaS adoption. However, in all these studies, there is no specific human factor that is considered for the adoption of SaaS. Consequently, it was suggested that a study of SaaS adoption could be very interesting if it is undertaken from the perspectives of specific attributes [21] such as human and organisation, investigating such factors are of great importance for SaaS adoption. Moreover, Kim et al., [25] analysed the factors affecting the intention to adopt CC-SaaS based on the risk and benefit from the user's perspective. The factors affecting small companies' intention in Korea to adopt CC-SaaS are investigated with the mediation of perceived risks and benefits. In addition, the opportunities and risks for CC-SaaS adoption were studied among German companies [16]. However, despite the relevance of these studies in the investigation of the influential determinants for CC-SaaS intention to adopt, the researchers have not been testing the moderating effects for the significant factors. Mohtaramzadeh et al. [26] stated that there is a need for understanding the moderating effects in the IT adoption research. The understanding of how the influence of moderators may affect the direct relationship between the determinants and the intention to adopt CC-SaaS is not less important [26], [27]. Furthermore, existing literature revealed organisations could experience many obstacles and difficulties in the adoption or even when intended to adopt CC-SaaS, especially regarding the information security and privacy against non-authorized access [4]. Besides, the absence of technical knowledge about any capabilities in terms of privacy from the side of CC-SaaS providers [28], lack of understanding between CC providers and the organisation for service scope and

implementation level [27], and technical barriers [1] can affect SaaS-CC adoption.

While CC-SaaS has the potential of providing significant opportunities to organisations through improvement in their IT at reduced cost and fewer management concerns [21], however, the adoption of CC-SaaS is still very challenging to organisations, more especially in such instances where no specific attributes to guide decision-making on the movement into CC-SaaS. Moreover, none of the studies reviewed above has provided a holistic analysis of the determinants that affect CC-SaaS adoption from user perspectives, and it is also clear that the insights provided by earlier studies with regards to CC-SaaS adoption are only small isolated explanations. And according to [29], [30], the investigation of CC must consider the context because different contexts might have specific determinants. Therefore, the investigation into the factors affecting CC-SaaS adoption could be of great significance. The fact is that organisations are doubting on factors with high priority that are critical for consideration in their decisions towards the movement into CC-SaaS [21]. This implied the need for further investigation into those factors that could significantly influence the adoption of CC-SaaS, which can help organizations gain important benefits from this type of technology. Conclusively, the factors are mapped with the existing literature on CC-SaaS intention to adopt, adoption.

CM: refer to the conceptual model

A review of the literature indicates that most of the previous studies used a single approach theoretical perspective in studying CC adoption [41]. However, this single approach is not sufficient to achieve the objective of the present study. It has been found that the lack of integration of adoption theories has hindered the understanding of the key factors [29]. Technological factors are not the only key determinants; other factors such as organisational, environmental factors, and human factors might have an important impact on the decision process, but they have not been integrated into most of the adoption theories [29]. However, it was recommended that other factors need to be considered in the CC-SaaS adoption; these factors relate to the organization and its wider operating environment and those relating to technical characteristics of CC-SaaS [33]. However, the decision process requires consideration of other perspectives [42]. Further, El-Gazzar [30], in his systematic literature review, calls the need for (1) more empirical studies; (2) cloud computing adoption is multifaceted, which requires the usage of multi-theoretical perspectives; (3) exploration of theories that explain how organisations react differently to a same internal and external factor. Therefore, a multi-perspective theoretical framework could be a solution for investigating the intention to adopt CC-SaaS by public organisations in unstable countries like Iraq. In addition, the literature on CC-SaaS adoption has focused primarily on the adoption in technologically developed countries, and it does not include any study carried out to investigate CC-SaaS adoption in unstable developing countries like Iraq at the organisational level. And while the public sector in Iraq plays a vital role in the country's development. Despite the importance of the public sector, our literature review indicates that limited studies are investigating the CC-SaaS adoption in this sector. The influential factors in the adoption

of CC-SaaS in the Iraqi public organisations have not been empirically investigated from the technological, organisational, environmental, and human perspectives. Thus, this study aims to study the impact of these factors in Iraqi public organisations. The current paper developed a research model based on the integration of TOE, DOI, and HOT-Fit to address the research gap. The model results from a rigorous review of the relevant influential determinants from the previous literature on CC adoption.

3. RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

The literature review reveals that many studies have been conducted on the adoption of CC-SaaS as presented in the aforementioned. And, because this study is the first of its kind in Iraqi public organisations, a preliminary study was conducted to identify the relevant factors from the point of view of CC experts. However, a literature survey was carried out to gather related information regarding the gathered factors and verify that these factors could be used in public organisations. The rationale associated with using several information sources is to produce comparable results that can improve the validity and credibility of the findings. This study's main aim is to identify and modelled the contributing factors that influence the public organisation among unstable countries like Iraq. As well as investigating the effect of Perceived Intensity of Civil Conflict.

3.1 The Study Model

In developing this study model, a multi-perspective theoretical framework was applied through the deployment of three models, TOE, DOI, and HOT-Fit, that integrate twelve independents, which are used to determine the dependent variable. The review of the literature revealed that these theories could be used to explain the association between technology, organisation, environment, and human factors for adopting CC-SaaS in Iraqi public organisations. The TOE was introduced by Tornatzky and Fleischer [43] as a multi-perspective framework. It illustrates a segment of the innovation process regarding how innovation adoption and implementation are influenced by the organisation context [44]. The Framework identifies three building blocks that influence the adoption of an innovation, which include technological, organisational, and environmental contexts [45]. Based on these blocks, three dimensions were identified to influence technology innovation's adoption process; technological, organisational, and environmental aspects that depend on an organisation's context [46]. On the other hand, the theory of Diffusion of Innovation was developed by Rogers [47], originating from sociology, and it helps explain adoption from an organisational perspective [48]. The DOI theory is considered one of the most broadly accepted models by researchers in the adoption of new technology, and it is treated as a significant theoretical model in technology diffusion research [47]. Further, HOT-fit model was established by Yusof et al.[49]. The established model was primarily derived from the application, expansion, and combination of IS success

model [50] and the IT Organisation Fit model [51], which focused on HOT and their Fit components with each other. The model was proposed by [49], which combined human, organisational and technological dimensions. It was suggested

by Yusof et al. [49] that researchers could use this new framework in many flexible ways; these include consideration of view of various stakeholders in IS development. Figure 1 presents the research model of this paper.

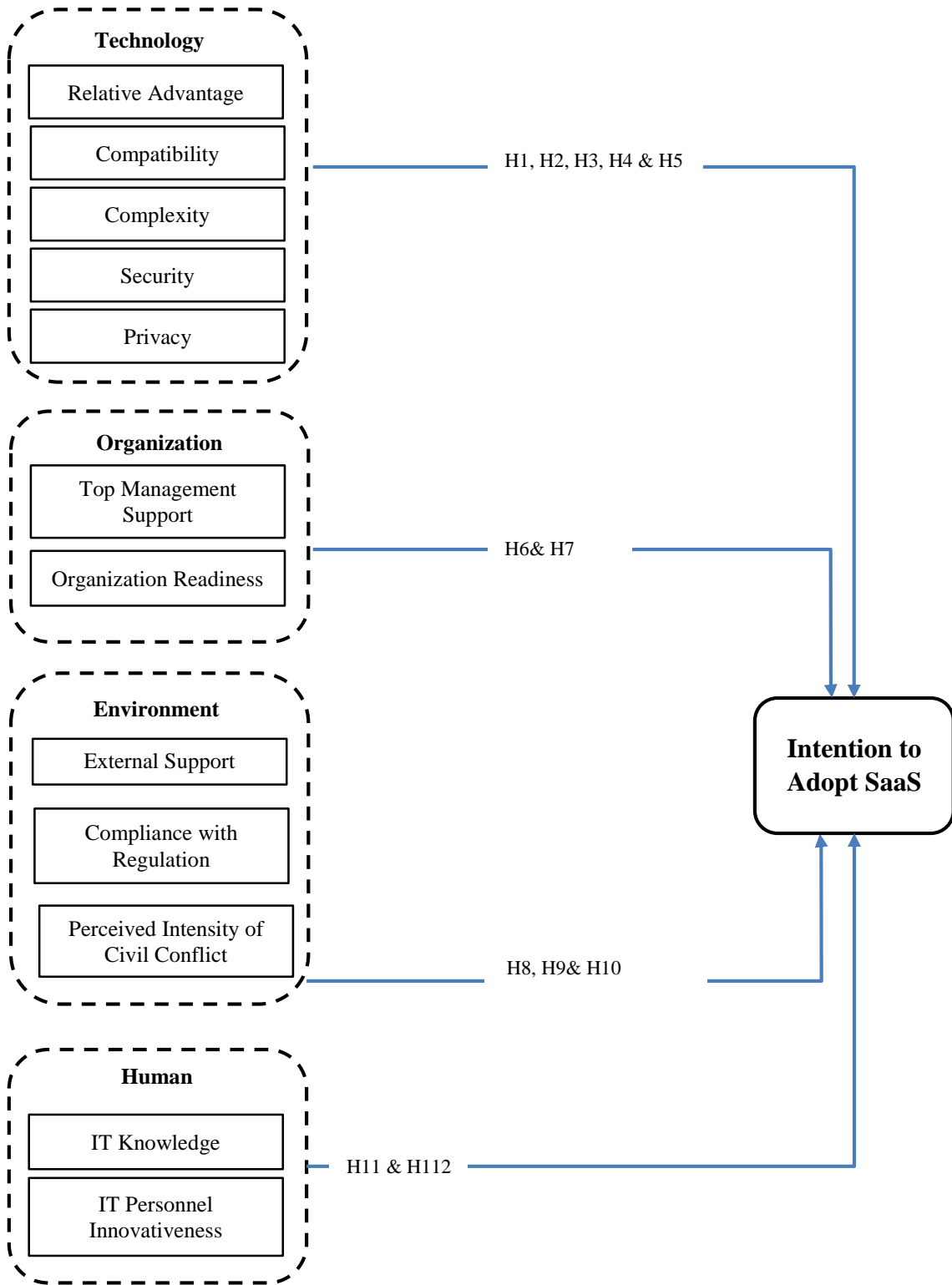


Figure 1.The Proposed Model of CC-SaaS Intention to Adopt

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 Iraqi public organization's decisions toward the adoption of CC-SaaS. The subsequent subsections explain the proposed model's conceptualization as a foundation for the adoption of CC-SaaS in the Iraqi public organisation.

3.2 Hypotheses development

Based on the explained theoretical model, the study constructed an understanding of the study variables' associations. The following subsections define these factors and their relation to this study's context and the hypothesis for each relationship.

3.2.1 The Technology Dimensions

Technological Dimensions (TD) have been considered in this study as technological factors that influence the organization's intention towards the adoption of CC-SaaS technology [52]. Five (5) technological factors have been identified in this study, which is classified as technological dimensions, which will be used to measure its influence towards intention for the adoption of 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.

Relative advantage

Relative advantage (RA) has been described as the extent to which users perceived CC-SaaS technology to be better than other competing computing paradigms [53]. This perception is mostly built based on the belief that CC-SaaS possesses some advantages in terms of economy and technology compared to traditional IT environments. The importance of RA was made it be placed among the key variables of DOI [47]. Thus, perceived benefits of technology and its value are among the key considerations mostly imbibe by organisations in the adoption of new technology [54]. So, the following hypothesis is proposed.

H1: Relative Advantage (RA) has a significant influence on the intention to adopt CC-SaaS.

Compatibility

Compatibility (CM) has been considered the degree to which users perceived CC-SaaS technology to be consistent with their current infrastructures, operational skills, and organizational needs of technology [53]. When viewed from the perspective of technology, compatibility is considered the degree to which CC-SaaS solutions are matched with organizations' existing systems. This has remained a major factor for consideration while deciding to move to a cloud environment. Besides, another crucial factor for consideration while organisation moves to cloud computing are the degree of compatibility

between the CC-SaaS services and the statutory regulations that govern the organization; hence the hypothesis is proposed as:

H2. Compatibility (CM) has a significant influence on the intention to adopt CC-SaaS.

Complexity

Complexity (CM_x) has been considered as the degree to which users perceived relative difficulty while learning or in the actual usage of CC-SaaS [53]. Within the IT adoption literature, CM_x has been seen from the perspective of time constraint requirement in task performance, simplicity in system integration, efficiency in data transfer, system functionality while performing the task, the how interface that has been designed, etc. These features imply that the easier an organisation perceived the integration of technology within its operations, the more likely its decision to adopt such technology [24]. Thus, the CM_x hypothesis is presented as:

H3. Complexity (CM_x) has a significant influence on the intention to adopt CC-SaaS.

Security

Security (Sec) has been considered the extent to which security measures have been installed to prevent unauthorized access or modification of information stored in the system processing or in transit for usage in CC-SaaS [55]. One of the key challenges that discourage several organisations from building intention towards adopting cloud services is security concern [54]. Security is a paramount issue in CC-SaaS adoption because it affects so many perspectives within IT, including how data is stored, transmitted, and lost; it also covers confidentiality, breach of privacy, and its suitability in the organisational operations [56]. So, the following hypothesis is proposed:

H4: Security (Sec) has a significant influence on the intention to adopt CC-SaaS.

Privacy

Privacy (PR_i) has been defined as data and information confidentiality which is offered by the CC-SaaS in which only the authorized person can have access to such data and information [57]. The fact is that privacy is at stake whenever there is the possibility for a third party to have access to the data stored and information managed because there could be a high tendency for user organisations to lose full control over the stored data or any information processed. Therefore, when there is an increase in the level of risk regarding confidentiality of data, there might be an eventual breach of privacy [54]; consequently, the issue of privacy remained a paramount concern for many organisations that intend to adopt cloud as means of storing their data and usable applications, which is resulted with the following hypothesis:

H5: Privacy (PR_i) has a significant influence on the intention to adopt CC-SaaS.

3.2.2 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 that eventually impact the SaaS-based CC adoption. Organizational dimensions has been classified into two (2) categories to estimate its influence towards the intention to adopt CC-SaaS. These dimensions are Top Management Support in the adoption of CC-SaaS as well as the Organisational Readiness towards the adoption of CC-SaaS. Hence, the influence of these factors on CC-SaaS adoption would be investigated in an unstable environment such as Iraqi,

Top Management Support

Top Management Support (TMS) refers to the management's commitment to providing the desired supports, including resource management, specification of goals, and decision-makers' commitment towards the adoption of CC-SaaS [55]. In the context of IT adoption, extant literature has recognized the important role of TMS in the initiation, implementation, and adoption of many forms of information technologies [58]. Salwani et al. [59] explained that TMS is a good reflection of the perceptions as well as actions undertaken by top officials, which ensures that organizations generate value through the adoption of technological innovation. Hence, the proposal of this hypothesis:

H6: Top management support (TMS) has a significant influence on the intention to adopt CC-SaaS.

Organisational Readiness

Organisational Readiness (OR) here refers to the determination of readiness of an organization in terms of technology and financial resources, which are considered vital in the CC-SaaS adoption process [21],[23]. It has been defined by Tan et al. [61] as the degree to which managers perceive and evaluate their readiness towards the possession of the desired awareness, governance structure, resources, and commitment that will ensure successful adoption of new technology. Therefore, the following hypothesis is deducted as:

H7: Organisational Readiness (OR) has a significant influence on the intention to adopt CC-SaaS.

3.2.3 The Environmental Dimensions

The third dimension is Environment Dimension (ED), which is recognized as the external factor that influences the intention towards adopting CC-SaaS technology [52]. This study recognizes three (3) important factors composed of 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.

External Support

External Support (ES) refers to providing all the necessary supports by various parties, including CC-SaaS providers, relative associations or training partners, which could influence the organization's intention towards the adoption of CC-SaaS [52]. In this study, external support is considered from a cloud provider's perspective, which will enable user organisations to meet their cloud service requirements. Thus, the research presented this hypothesis as:

H8: External support (ES) has a significant influence on the intention to adopt CC-SaaS.

Compliance with Regulation

Compliance with Regulation (CR) is considered the absence of clear government regulations or rules that can provide necessary support to organisation in the adoption of CC-SaaS, especially in a data breach [62]. Lack of a CR has the potential to hinder an organisation from adopting cloud technology. The fact is that the absence of desired IT standards and regulations that can support organisations in breaches of cloud privacy and security can affect their decision towards adopting technology such as CC-SaaS [54]. So, the following hypotheses are proposed:

H9: Compliance with regulations (CR) has a significant influence on the intention to adopt CC-SaaS

Perceived Intensity of Civil Conflict

Perceived Intensity of Civil Conflict (PICC) is considered here as the organization's consciousness with regards to the massive violent forces that surround and fuel civil conflict resulting from political and sectarianism differences with respect to the national values employed for the conflict's perpetuation [63]. This is a critical factor with respect to the countries experiencing civil conflict. Thus, the adoption of technology such as CC-SaaS could potentially solve massive violence that surrounds those countries as a result of sectarianism and political instability, which can adversely affect services delivery by the government to the citizens. Therefore, in this study, PICC is considered the consciousness of the organisation with respect to the recurrent massive violence forces that trigger civil conflict resulting from sectarianism and political differences that affect national values that are deployed to perpetuate the conflict [63]. Review of the existing studies revealed a lack of studies investigating the effect of PICC on the adoption of CC in a conflict environment, especially in a country like Iraq. Further, the hypothesis of PICC is presented as:

H10. Perceived Intensity of Civil Conflict (PICC) has a significant influence on the intention to adopt CC-SaaS.

3.3.4 Human Dimension

The fourth is Human Dimension (HD), which is considered those human factors that influence the organization's intention towards the CC-SaaS technology adoption [64]. Two (2) human factors have been recognized in this study under this dimension, and it is used in measuring its influence on the intention towards the adoption of CC-SaaS in an unstable environment as Iraqi. These include IT Knowledge of the managers and IT personnel Innovativeness.

IT Knowledge

IT Knowledge (IK) is defined here as the technical skills and personal abilities, and capabilities of IT managers in foreseeing and leveraging the potentials of CC-SaaS in the achievement of the organisational goals [65]. It has been recognized within the extant literature that the IT personnel's technical capabilities, knowledge, and competencies will likely impact the organisational decision towards adopting an IT innovation [66]. Hence, the following hypothesis is proposed:

H11: IT Knowledge (IK) has a significant influence on the intention to adopt CC-SaaS.

IT Personnel Innovativeness

IT Personnel Innovativeness (IPI) has been defined as the curiosity of an individual who is trying to adopt CC-SaaS and applying IT solutions in such novel ways to support and improve service delivery to the organisation [67]. Agarwal and Prasad [68] explained that personal innovativeness is the risk-taking propensity by some personnel of an organization different from others. In this, such individuals have the propensity and willingness to take risks by trying new things, thus having more exposure to high levels of uncertainty [69]. Thus, the hypothesis of IPI is presented as:

H12: IT Personnel Innovativeness (IPI) has a significant influence on the intention to adopt CC-SaaS.

4. METHODOLOGY

This study is concerned with modeling the associations among the key factors affecting the Iraqi public organisation's intention toward adopting CC-SaaS. Sekaran and Bougie [70] highlighted the need to select the most appropriate research approach and design that can answer the main research question(s). Hence, a quantitative research approach has been adapted; such an approach also enables researchers to generalize their research findings to the whole population [71]. In addition, through quantitative approach, researchers can conduct examinations on the significance between and among the number of research variables and; therefore, considering the test of certain hypotheses in this study for the examination of the relationships between the variables of the study, it is regarded as empirical and correlational in nature.

4.1 Instrument Development

This study's main objective is to identify the factors affecting CC-SaaS adoption in Iraqi public organisations using the

integration of TOE, DOI, and HOT. For this, a self-administered questionnaire was developed in which data were collected from public organisations lies under Iraqi ministries. To achieve this, all the items used in measuring the variables were adapted from previous studies, as shown in Table 1, and the item was framed on a five Likert-Scale from 1 ("strongly disagree") to 5 ("strongly agree"). To ensure the validity of the measurements used, two consecutive rounds of pre-testing were conducted in order to ensure that respondents can understand the items used in the study: first, the questionnaire was reviewed by the academic researchers experienced in questionnaire design, and next, the questionnaire was piloted with a number of IT professionals.

Table 1. Questionnaire development based on items from the literature

Variable(s)	References
Relative Advantage	[72], [73], [74]
Compatibility	[73], [74]
Complexity	[73], [75]
Security	[73], [75], [76]
Privacy	[75], [76]
TOP Manganate Support	[72],[73],[74]
Organisation Readiness	[74],[77],[78]
External Support	[78], [79]
Compliance with Regulation	[80], [46]
Perceived intensity of Civil conflict	[81]
IT Knowledge	[79]
IT Personnel Innovativeness	[82], [79]
Intention to Adopt	[76],[73]

4.2 Data Collection and Analysis

A Questionnaire survey was used to collect the empirical data for this study that were distributed via two methods; mail and walk-in. The responses on the questionnaire were collected from IT professionals in the selected organisation who have a position in the process of IT projects. Moreover, the study used two control measures through screening of the questions used in this survey. The first control measure was evaluating the role of the person who participated in the survey through the exclusion of the personnel who are not part of the IT decisions in the participating organisations. The second control measure was CC experience, which excludes all the participants who do not have any experience with CC. Most of the responses were collected through personal visits to the respondents, and a round of conversation was held before seeking their responses on the questionnaire. Other responses were collected through e-mail. This conversation was aimed to understand their preparedness for CC adoption and their related future plans. In total, 450 survey questionnaires were distributed to the targeted organisations among six Iraqi ministries. Out of a total of 450 distributed questionnaires, 367 were returned; this accounted for about 81.5 % response rate. The returned questionnaires'

percentage is considered very high compared with other studies conducted within the same context and domain, which gained about 40 % as a response rate [83]. Out of 367 responses, 301 were found to be valid. Therefore, for the data analysis, several data analysis techniques were applied as a normal tradition for the evaluation of empirical studies. Moreover, the collected response was analyzed using the partial least square structural equation modeling (PLS-SEM) technique. The Smart-PLS statistical software package version 3.0 was used to run the analysis and validate the structural model after confirming the measurement model's appropriateness.

5. RESULT AND ANALYSIS

5.1 Demographic Characteristics

Based on the demographic analysis, the respondents of this study were composed of females and males. The gender analysis was assessed from the 367 respondents, 175 are females (47.70%), and 192 are males (52.30%) with an average age of 40 years old. This proportion is acceptable since, in most Iraqi public organisations, male staff usually outnumbers their female counterpart, notably in the IT field. Although the percentage of males is higher than females, the proportion is considered appropriate for any statistical study because there are no assumptions about the sample size between males and females [84]. Furthermore, the participants' age was checked based on five categories, around 7.63 % of respondent were between the ages of 18 and 27; 29.70% aged between 28 to 37; 36.24% aged between 38 to 47; 22.34 % aged between 48 to 57 and 4.09% of the respondents were above 57 years old. The results show that the prominent age is for the middle generation (38-47) and that the last category is the older generation. In terms of the educational level, only a few IT professionals hold a diploma with 1.09%. In comparison, others with Bachelor's degrees account for 53.41%, those with Higher Diploma about 14.99%; Master's degree about 18.53%; and those having Ph.D. about 11.99%, in essence, these indicate that staff in Iraqi ministries, notably in IT field are highly educated and competent. The results reflect the nature of the population of the organisation as the majority of the staff are in the bachelor degree category, and the least is in the diploma category.

Finally, most of the IT professionals have more than ten years of experience in their jobs, representing about 52.32%. In contrast, those who have experience of between six to ten years account for 38.42%; those having experience between two to five years represent 6.81% of the respondents.

5.2 Model analysis

To verify the model, the PLS-SEM has been applied for the data analysis phase; while choosing the PLS-SEM, it is important to note that the SEM has two models which researchers must adhere to while performing data analysis; the measurement and structural models. Therefore, the present study adopts the two-step process suggested by Hair et al. [85] in conducting the analysis. The first step is the assessment of the measurement model, while the second is the assessment of the structural model. In the measurement model assessment, the reliability and validity of the constructs are examined. The structural model assessment aims to verify the model hypotheses.

5.2.1 Measurement Model

The measurement model was used to establish the data's validity and reliability. This approach has been followed to ensure high quality and eligibility of the results as recommended by Hair [87]. All items are identified as reflective indicators. The evaluation of construct reliability is normally undertaken through the assessment of internal consistency by using values of Alpha (α) and or composite reliability (CR) based on the common threshold of 0.70 [85]. As shown in Table. 2, in the current study, the CR values for the model's constructs ranged from (0.828) to (0.971), two constructs have gained (0.970 and 0.963); nevertheless, this result has been supported by several prior studies [88], [89]. Thus, it is considered a satisfactory criterion for constructs [87]. CR values for all the constructs were greater than the recommended threshold of 0.7, which confirmed that each of the constructs' indicators clearly reflects the latent variable associated with it. Hence, the results provided evidence for good internal consistency reliability

Table 2. Analysis of Internal Consistency.

Construct	Cronbach's Alpha	Composite Reliability	AVE	Construct	Cronbach's Alpha	Composite Reliability	AVE
Relative Advantage	0.962	0.970	0.867	External Support	0.866	0.910	0.718
Compatibility	0.835	0.883	0.603	Compliance with Regulation	0.896	0.923	0.707
Complexity	0.890	0.92	0.699	Perceived Intensity of Civil Conflict	0.870	0.906	0.659
Security	0.818	0.88	0.646	IT Knowledge	0.790	0.864	0.614
Privacy	0.893	0.928	0.765	IT Personnel Innovativeness	0.963	0.971	0.872
Top Management Support	0.877	0.910	0.671	Intention to Adopt	0.875	0.909	0.667
Organisation Readiness	0.807	0.873	0.634				

In terms of convergent validity, it is achieved when the AVE of a given construct has a value equal to or above 0.50, as suggested by Henseler and Sarstedt [86] and Hair et al.[90]; this implied that the latent variable's explanatory power is, on average more than half of its indicators' variance. In the present study, all AVE values presented in Table 2 confirmed that the constructs had achieved an acceptable level of convergent validity as the values for the AVE exceed the recommended threshold of 0.50 and ranged from 0.592 to 0.872. The result depicts that the optimized measurement model of the study revealed sufficient convergent validity.

5.2.2 Structural Model

Upon the establishment of the measurement model's reliability and validity, the evaluation of the structural model will enable

the testing of the hypothesized relationship [91]. The structural model's evaluation was assessed using the significance of the path coefficients, which indicate the strengths of relationships between dependent and independent variables, and the assessment of R2 value, which reflects the percentage of the variance of the endogenous construct (dependent variable) accounted by one or more exogenous constructs (independent variables). In assessing the R2 values in this study, the suggestion of Chin [92]. Based on the results of R2 in explaining the intention to adopt CC-SaaS, it was found to be high as the R2 value was 0.795. In addition, to obtain t-values, each path's significance was estimated using a PLS bootstrapping method using 5000 resamples. Table 3 presents the results of the hypotheses testing. The results showed that hypotheses H8 and H9 are rejected while the rest are significantly supported.

Table 3. Hypotheses results.

Hypothesis	Construct	Construct Code	Path Coefficient	Std. Error	T-value	Result
H1	Relative Advantage	RA	-0.200	0.047	4.240	Support
H2	Compatibility	CM	0.165	0.043	3.856	Support
H3	Complexity	CMx	0.065	0.023	2.798	Support
H4	Security	Sec	0.082	0.029	2.791	Support
H5	Privacy	Pri	0.082	0.030	2.76	Support
H6	Top Management Support	TMS	0.095	0.031	3.089	Support
H7	Organisation Readiness	OR	-0.115	0.041	2.812	Support
H8	External Support	ES	0.040	0.045	0.896	Not-Support
H9	Compliance with Regulation	CR	0.069	0.064	1.067	Not-Support
H10	Perceived Intensity of Civil Conflict	PICC	0.160	0.041	3.870	Support
H11	IT Knowledge	ITK	0.129	0.040	3.234	Support
H12	IT Personnel Innovativeness	IPI	0.127	0.044	2.850	Support
	Intention to Adopt	INT				

6 .DISCUSSION

The TOE, DOI, and HOT models have been utilized to investigate the contributing factors that influence Iraqi public organizations' decision to adopt a CC-SaaS. According to the

result of the tested model, to decide to adopt CC-SaaS technology in any organization, the technology's technology characteristics should fit with the organization's tasks that to be adopted, followed by a number of external and internal factors such as human, organisation, and environment. In this study,

four dimensions were examined. The analysis of the hypotheses for all supported results except H8 and H9. The analysis indicates that H1 postulated that RA significantly influences INT of CC-SaaS among IT professionals. The result revealed that this relationship is statistically significant ($\beta=-0.200$, $t=4.240$, $p<0.00$). Thus, this finding supports the postulation of hypothesis H1. Similarly, the result also revealed a significant effect of CM on INT ($\beta=0.165$, $t=3.856$, $P <0.00$), thereby supporting hypothesis H2. Likewise, hypothesis H3, which postulated that CMx would significantly influence the INT, is also supported ($\beta=0.065$, $t=2.798$, $p<0.005$). Also, hypothesis H4 examined the relationship between Sec and INT; the result revealed a significant positive relationship between these constructs ($\beta=0.082$, $t=2.791$, $p<0.005$), thus supporting the postulation of this hypothesis. Additionally, as postulated, the result of hypothesis H5 revealed a significant relationship between Pri and the INA ($\beta=0.082$, $t=2.760$, $p<0.006$). In essence, all the technology constructs have significant effects on the intention to adopt CC-SaaS. Besides, hypothesis H6 is also supported ($\beta=0.095$, $t=3.089$, $p<0.002$). Similarly, hypothesis H7, which postulated a significant relationship between TMS and OR towards INT, is also supported ($\beta=0.115$, $t=2.812$, $p<0.005$), and this indicates that the organisation dimension has a significant effect on the intention towards the adoption of CC-SaaS. Conversely, the three drivers of the environment dimension (i.e., ES, CR, and PICC) show different results. ES does not affect INA ($\beta=0.040$, $t=0.896$, $p=0.370$), and CR does not affect INA ($\beta=0.069$, $t=1.067$, $p=0.286$), which implied that the H8 and H9 are not supported. Contrarily, PICC was found to significantly affect INA ($\beta=0.160$, $t=3.870$, $p<0.000$), thus H10 is supported. Further, H11 posited that ITK would significantly influence the INT. The analysis results confirmed the postulation of this hypothesis ($\beta=0.129$, $t=3.34$, $p<0.001$). Following that, hypothesis H12 examined the effect of IPI on INT; interestingly, this hypothesis's postulation is supported, which confirmed that IPI has a significant positive effect on INT ($\beta=0.127$, $t=2.850$, $p<0.004$). As a result, the human dimension was found to have a significant effect on the intention towards the adoption of CC-SaaS.

8. 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, the adoption of CC-SaaS 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 capacity and propensity of the

organisation should be increased in order 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 and merge it to their existing knowledge (relating to internal operations and planned innovations) and apply the same to explore high value for the business using SaaS. 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. However, to adopt CC-SaaS in Iraqi public sector organizations, many factors should be investigated to measure the applicability of CC-SaaS to Iraqi governmental organisations. Consequently, this study proposed CC-SaaS intention to adopt the model through the combination of TOE, DOI, and HOF, which is considered highly robust due to the incorporation of widely important factors. The tested model results 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 transition. Furthermore, after the test of twelve hypotheses, the empirical result proved that, without External Support (ES), the Iraqi organizations can adopt CC-SaaS successfully. Also, the factor Compliance with Regulation has the potential to hinder an organisation from the adoption of cloud technology; however, in the Iraqi context, this analysis revealed that the CR would not have an effect for the adoption of CC-SaaS, this is due to the absence of any available regulations governing the IT or IS adoption in the country.

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