

INFORMATION SECURITY CHALLENGES TO ADOPT CLOUD COMPUTING IN IRAQI UNIVERSITIES

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Abstract:

Adopting Cloud Computing (CC) in a university infrastructure bring essential security issues. Successful execution of CC in a needs proper organizing and understanding in the challenges and important factors that may affect the adoption regarding CC in their providers . In Iraq, there are a number of antecedents facing the universities relating to the utilization of CC providers systems by their employees . In this paper, the analysts proposed a model making use of a quantitative research style to verify the suggested factors and construct the relationship between them. The main elements that may affect a universities to adopt CC was declared as: Security, Privacy, Awareness, Availability, Scalability, Accessibility, Trust, and Technical Support. In order to verify that the design of questionnaire, has been followed up with two steps of verification. First of all , a validation stage in which, the list of questions checked by a section of specialists in the field in cloud computing technology, [the feedback received was implemented before proceeding in order to the second stage . Secondly, a pilot research was carried out to check the dependability of the device . The gathered data has been examined using the Cronbach's Alpha coefficient dependability test in SPSS 24 software package. The final results demonstrated that all elements are reliable as they obtained a value of 0.7 and over in the test.

Keywords: (cloud computing adoption, university, pilot study, Cronbach's Alpha, Iraq).

تحديات أمن المعلومات لاعتماد الحوسبة السحابية في الجامعات العراقية

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الملخص:

يؤدي اعتماد الحوسبة السحابية (CC) في البنية التحتية للجامعة إلى حدوث مشكلات أمنية أساسية. التنفيذ الناجح لـ CC في حاجة إلى تنظيم وفهم مناسبين للتحديات والعوامل المهمة التي قد تؤثر على تبني CC في مقدمي خدماتهم. في العراق ، هناك عدد من السوابق التي تواجه الجامعات فيما يتعلق باستخدام موظفيها لأنظمة مقدمي

خدمات المشاع الإبداعي. في هذه الورقة ، اقترح المحللون نموذجًا يستخدم أسلوب البحث الكمي للتحقق من العوامل المقترحة وبناء العلاقة بينهم. تم الإعلان عن العناصر الرئيسية التي قد تؤثر على الجامعات في تبني المشاع الإبداعي على النحو التالي: الأمان والخصوصية والوعي والتوافر وقابلية التوسع وإمكانية الوصول والثقة والدعم الفني. من أجل التحقق من أن تصميم الاستبيان ، تمت متابعته بخطوتين للتحقق. بادئ ذي بدء ، مرحلة التحقق من صحة قائمة الأسئلة التي تم فحصها بواسطة قسم من المتخصصين في مجال تكنولوجيا الحوسبة السحابية ، تم تنفيذ الملاحظات الواردة قبل المتابعة حتى المرحلة الثانية. ثانيًا ، تم إجراء بحث تجريبي للتحقق من موثوقية الجهاز. تم فحص البيانات التي تم جمعها باستخدام اختبار موثوقية معامل ألفا من كرونباخ في حزمة برامج SPSS 24. أظهرت النتائج النهائية أن جميع العناصر موثوقة حيث حصلت على قيمة 0.7 وما فوق في الاختبار.

الكلمات المفتاحية: (اعتماد الحوسبة السحابية ، جامعة ، دراسة تجريبية ، ألفا كرونباخ ، العراق)

I. Introduction

Academic use of cloud providers is desired as these providers can provide a number of advantages. Possible benefits such as anytime/ anywhere accessibility to documents as well as files, synchronization associated with data throughout devices, simple to share data, data redundancy, unique learning using no up-front funds investment and repair responsibility (Abdollahzadegan, Hussin, Razak, Moshfegh Gohary, & Amini, 2013; Al-Khayat & Al-Othman, 2016). Provided the appearance of cloud services a restrictions such as interoperability as well as compatibility troubles , low storage space capacity, set up , backup, as well as recovery expenses have already been largely resolved (Al-Shqeerat, Al-Shrouf, Hassan, & Fajraoui, 2017; Alsanea, 2015). On the other hand , some difficulties still require to be addressed like security as well as privacy troubles (Ariwa & Ariwa, 2017; Azeemi, Lewis, & Tryfonas, 2013).

Cloud computing identifies expandable as well as on need services which are served through the Internet from particular data centers (Barnwal, Noida, & Jangade, 2014; Breivold & Crnkovic, 2014). These types of services get the potential allow and help both formal as well as informal understanding by permitting students as well as academics share knowing resources, communicate and brainstorm alternatives , elaborate reviews , and create conceptual styles (Peltier, 2004; Sahandi, Alkhalil, & Opara-Martins, 2012). In this research , cloud services make reference to the Internet dependent applications that supply different services like social networking, dispersed file systems, as well as structured storage space systems like Google Drive, Drop box (enable people to save , synchronize, plus share files) also Ever note (enables users to produce text, audio, as well as video memos). A study into the actual determinants of academic using cloud services has been studied planning to identify the effect of security in addition to privacy issues on apply behavior. The final results of this analysis may result in successful knowing for the utilization of cloud services in educational settings.

Cloud computing is a technology that uses the internet also central remote control servers to keep data and programs. It is a advertising term for technologies that provide computation,

software, data accessibility , and storage providers that don't need end-user understanding from the physical location as well as settings of the system which delivers the actual services (Rajan & Jairath, 2011). Cloud improves effort , agility, climbing , and availability, and supplies the possible for cost reduction through optimized and efficient computing. Cloud computing allows the academic staff to make use of applications without set up and entry their personalized files from any kind of computer together with internet access. All these people need is to obtain the advantages of using a software or even hardware from the computer like sending emails etc. Security issues are of more concern to cloud service providers who are actually hosting the services. We have discussed few security challenges to adopt CC with its solutions.

This paper covers the particular cloud computing security concerns associated with enterprise cloud computing which includes its threats, danger and vulnerability. Throughout the years, universities have got skilled and will keep on to experience with this cloud computing period several system losses that will have got a direct effect on their the majority of valuable asset, information (Dutta, Peng, & Choudhary, 2013). and its protection is utmost important to all universities. There have been promoted attacks about cloud computing suppliers and this paper covers recommended steps in order to handle cloud security, problems to explain before adopting cloud computing.

The adoption of cloud computing services also tools has become one of the fundamental criteria for creating the things needed for modern society. Great attention is paid to including key factors for the development of an appropriate developing model in different developing countries, which in turn consists of understanding along with the proficiency of the use of CC and important experiments in order to adopt them as a core component in the universities.

II. Research Model

The current study comes within the broad theoretical field. The research model proposes the adoption regarding Cloud Computing within terms of information security challenges as a dependent adjustable. This may be taken the level associated with intention which universities have got to adopt this new innovation system. The main factors that can affect the universities to adopt CC was declared as: Security, Privacy, Awareness, Availability, Scalability, Accessibility, Trust, and Technical Support. In the current study, the variables affiliated are identified based on the current review of several models and theories. After that, these parameters have conceptualized to get studied with this study. Figure1 shows that the main conceptual model of this study.

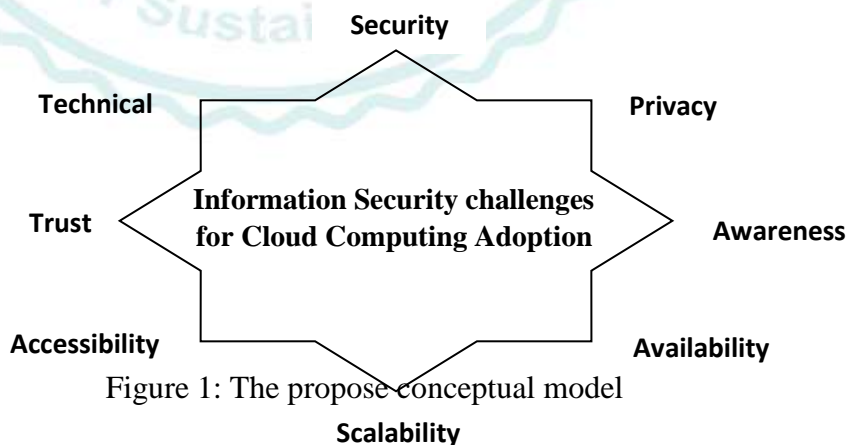


Figure 1: The propose conceptual model

III. Material AND Method

A descriptive, study research style was chosen in order to investigate the major factors associated with information security challenges to adopt cloud computing in Iraqi universities. A questionnaire technique was used for data collection in order to determine universities' staff views. The main cause for selecting questionnaire returning to its feasibility within simplifying the investigation from the data much more 'scientifically' plus objectively compared to other types of research. Additionally , it may also assist researcher to evaluate and contrast some other research and may be utilized to calculate change positivists think for analyzing current hypotheses (Wright, 2005).

IV. Questionnaire Construction

The designed instrument tool was depending on closed ended queries, in which usually the respondents need to give a precise answer for every question/item. All of the items were modified from previous research that depending on the contents of every factor. Table 1 indicates the operationalization from the factors and items. Five likert scale (strongly disagree, disagree, not sure, agree, strongly agree) used in this study to determine the level of agreement among the respondents. Five likert scale is one of the widely used scale for providing a clear view about one's proposition in certain aspect. Before starting the questionnaire, a brief description about the research study and its objectives along with a confidentiality rules have been provided. The actual questionnaire prepared in English and after that translated into Arabic, which may be the official language in Iraq .

V. Questionnaire Validation

The questionnaire validity assessed by taken some steps before the last submission in order to make sure that all queries /items are proper and free associated with errors. These types of steps involve sending the questionnaire to six experts in the field. Those experts are instructors in the Iraqi universities that have an experience using Cloud Computing technology. The questionnaire evaluated for language, clarity, contradiction or duplication. Before the distribution, some recommendations and comments followed up by applying appropriate modifications.

VI. PILOT STUDY

A variety of researchers recommended doing pilot studies (Goodman, Meltzer, & Bailey, 1998 Smith & Studd, 1992). The goal of the pilot research is to check the research instrument. According to Cohen, Manion & Morrison (2013), all gathered data need to be piloted in order to verify that all questions and even instructions are very clear. This procedure allows the researchers to eliminate any: items which do not yield useful data. Therefore, the function of the pilot study is to make sure that the chosen format for the study is appropriate before proceeding to apply the main tool.

Thus, the questionnaire was distributed among the academic staff that are using CC services in different private and public universities in Baghdad-Iraq. A total of 36 responses has been received and this considered appropriate for a pilot study as suggested by (Johanson & Brooks, 2010), who declared that 30 representative participants from the population of interest is a reasonable minimum recommendation for pilot study. The participants' demographic background items are gender (23 males and 13 females), (2) age group (13 of them 31-40 years old, 12 aged 41-50 years old, 4 aged below 30 years old, while 2 aged over 50 years old.

VII. Pilot Study Results

The most generally used check in dependability way of measuring any kind of pilot study questionnaire is Cronbach's Alpha (Cronbach, 1946; Sekaran & Bougie, 2010). According to George & Mallery (2003) Cronbach's Alpha check possesses values inside the range of 0 to 1; a higher level of range signifies greater value regarding dependability. Values of 0.9 and over are excellent, 0.8 and over are good, 0.7 and over are suitable, 0.6 and over are questionable, and less than 0.6 are weak. The data gathered from the pilot study happen to be examined using Statistical Package for the Social Sciences (SPSS v.24) to recognize the values of every factor in Cronbach's Alpha.

Depending on the pilot study, the test result showed that all items are reliable since it resulted in a value of about 0.7 and above cronbach's alpha reliability test.

Table 1: Operationalization of the factors/items and Cronbach's Alpha

Construct No.	Scale Name	Cronbach's Alpha value	item No.
1	Security	0.727	6
2	Privacy	0.817	5
3	Awareness	0.789	6
4	Availability	0.713	5
5	Scalability	0.827	5
6	Accessibility	0.705	6
7	Trust	0.804	5
8	Technical Support	0.724	5
9	Cloud Computing Adoption	0.721	9

VIII. Conclusion

This kind of research was proposed to examine the influencing factors that impact the actual CC services inside Iraqi universities in terms of security concerns. This study was prompted through a real require to look at the requirements, challenges, and spaces facing the complete utilization of CC systems in Iraqi universities. A questionnaire was designed based on previous studies that investigate the proposed factors. A pilot study was conducted to examine each influencing factor and to test the reliability of the questionnaire. This kind of studies were required to verify that all those items are dependable and free of mistakes. Cronbach's Alpha check in the pilot research reveals that all those factors have got values of 0.7 and over, which are suitable. The pilot study

was conducted using questionnaire that was disseminated to user's CC services in a number of private and public universities in Iraq. A study paper follows this kind of study to demonstrate the results from the data analysis from the main study. Future research will test the ideas and validate the last model.

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Questionnaire Survey

INFORMATION SECURITY CHALLENGES TO ADOPT CLOUD COMPUTING IN IRAQI UNIVERSITIES: PILOT STUDY

Dear Respondent

You are invited to participate in a research being conducted for an academic purpose. This research aims at showing the concerns and challenges of the adoption of Cloud Computing technology to develop an adoption model in Iraqi universities.

I will be obliged if you co-operate with me in completing the questionnaire. It will take approximately 20 minutes to complete the survey.

If you have any question or concern regarding this study, please feel free to contact me via:
mobile: (07736003453)
osamahwaleed@gmail.com.

Since the questionnaire is being used for academic purpose, the information gathered will be strictly confidential.

Thank you for your participation in this study. Your contribution is greatly appreciated.

Kindly tick (√) as appropriate

Personal Details	
1. Gender <input type="checkbox"/> Male <input type="checkbox"/> Female	2. Qualification: <input type="checkbox"/> Bachelor <input type="checkbox"/> Master <input type="checkbox"/> PHD <input type="checkbox"/> Others
3. Age Group <input type="checkbox"/> Below 30 years <input type="checkbox"/> From 31 to 40 <input type="checkbox"/> From 41 to 50 <input type="checkbox"/> Above 50	4. Type of Position <input type="checkbox"/> Administrative <input type="checkbox"/> Academy <input type="checkbox"/> Academy with administrative position
5. Position <input type="checkbox"/> Dean <input type="checkbox"/> Head of Department <input type="checkbox"/> Director <input type="checkbox"/> Lecture <input type="checkbox"/> Others <input type="checkbox"/> Vice Dean <input type="checkbox"/> Programmer <input type="checkbox"/> Assistant Director <input type="checkbox"/> Engineer	6. Years of Experience <input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1-3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-11 years <input type="checkbox"/> Over 12 years
7. How important is innovation to your educational institution? <input type="checkbox"/> Very important - It's one of the top priorities and part of the education <input type="checkbox"/> Important - It's used as an important instrument to improve the education <input type="checkbox"/> Medium Priority - It's of average importance and used to enable competing against rivals. <input type="checkbox"/> Low Priority - It's of little importance and sometimes driven by educational institutions <input type="checkbox"/> Not a Priority - It's NOT important to the education.	
8. How important is cloud computing to your educational institution? <input type="checkbox"/> Very important - It's one of the top priorities and currently fully enabling our education to use cloud computing <input type="checkbox"/> Important - It's a significant goal and currently enabling part of the education to use CC. <input type="checkbox"/> Medium Priority - It's of average importance and some limited usage has taken place <input type="checkbox"/> Low Priority - It's of little importance but there are plans to adopt this technology in the future	

☐ Not a Priority - No plans to adopt cloud computing.						
Index	Security	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<i>Se.1</i>	Security concern is very essential in order to adopt CC technology					
<i>Se.2</i>	I think that the services carried out on CC are secure					
<i>Se.3</i>	I think that the personal information that I provide on CC is well protected					
<i>Se.4</i>	Degree of educational institution's concern with data security in CC.					
<i>Se.5</i>	The data security is the biggest challenges facing the university to adopt any new technology					
<i>Se.6</i>	It can be considered a contract agreement between the university and the service provider as a safety and reliability of the data.					
Index	Privacy	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<i>Pr.1</i>	I think that the confidentiality and privacy of my personal information is assured when I use CC system					
<i>Pr.2</i>	Being concerned about user privacy is important.					
<i>Pr.3</i>	We have to keep the privacy of students and his lecturers.					
<i>Pr.4</i>	The adoption and use of Cloud Computing Technology Lead to develop a plan to protect the privacy and confidentiality of the information					
<i>Pr.5</i>	The Cloud Computing service provided by Google Inc., which is the e-mail service (Gmail) used in the university safer and have more privacy than the old system.					

Index	Awareness	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Aw.1	I will encourage the use of CC system among my colleagues.					
Aw.2	I need the CC system to provide effective educational system.					
Aw.3	I aware of how to use CC system in my job.					
Aw.4	I can use the CC for straightforward activities.					
Aw.5	All staff should learn to use the CC system effectively.					
Aw.6	Overall, my awareness about CC system usage is high.					
Index	Trust	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Tr.1	I believe that Cloud Computing is trustworthy					
Tr.2	I am not worried to use CC, as I know my information will be secured and safe.					
Tr.3	I feel secure sending sensitive information across the CC.					
Tr.4	You trust the CC system and believe that it is a well-reliable system.					
Tr.5	The CC provider will not divulge any of my information to the third Party					
Index	Availability & Affordability of the hardware and software	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
AA.1	Hardware and software for CC system are available					
AA.2	Required ICT is easily available for the educational institutions involved.					
AA.3	Hardware and appropriate Software are affordable					
AA.4	Appropriate computers are available and affordable for CC system					
AA.5	Appropriate manuals for implementation and training are ready					
	Scalability					

Index		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Sc.1	Our university will be able to use existing duties processes with cloud computing					
Sc.2	Cloud computing technology will work with our existing information systems set up					
Sc.3	Using cloud computing technology is compatible with all aspects of our work					
Sc.4	The IT infrastructures in our university are adequate for the adoption of a new technology					
Sc.5	Our university employees are capable of responding adequately to the adoption of new technology					
Index	Accessibility	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ac.1	Bandwidth required for connection is viable for educational institutions					
Ac.2	Our university requires good information and communication technology infrastructure.					
Ac.3	Networks potentially have a role in increasing the use of CC system.					
Ac.4	Our educational institution has a high degree of systems inter-connectivity					
Ac.5	Our educational institution's system are sufficiently flexible to incorporate electronic links to external parties					
Ac.6	Data is captured and made available to everyone in the university in real time					
Index	Technical Support	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
TS.1	I always have technical support whenever I face problem in the Cloud Computing services.					
TS.2	The respond of technical staff is					

	fast and effective.					
TS.3	I think that Cloud Computing support is good					
TS.4	With the availability of technical support, I do not feel worry using Cloud Computing services.					
TS.5	I am satisfied with the technical support.					

CLOUD COMPUTING ADOPTION

(The act of accepting the cloud computing technology with approval)

For each statement, indicate the extent of your agreement or disagreement based on your personal knowledge of CC systems and information systems

Index	Cloud Computing Adoption	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
CCA.1	CC system is an attractive technological option to the universities.					
CCA.2	CC system is an attractive university process option					
CCA.3	The universities' focuses on new IT systems, which aim to increase student's satisfaction.					
CCA.4	The universities' focuses on new IT systems, which aim to increase lecturer's satisfaction.					
CCA.5	I want to know more about CC.					
CCA.6	The universities' Focuses on new IT system projects, which aim to maintain competitive advantage.					
CCA.7	I have the intention of managing my accounts in CC.					
CCA.8	The adoption of CC system in IT operations will support the education process.					
CCA.9	In my opinion, it is desirable to use CC technology					

Thank you for your co-operation!