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Factors Influencing Cloud Computing in Telecommunications Companies

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Article Info	ABSTRACT
	This study aims to identify the role of cloud computing in achieving success in e-governance in Jordan. This paper investigates the effect of four accomplishment aspects (availability, flexibility, cost saving and scalability) for executing cloud computing technology in telecommunication companies on Jordan e-governance implementation. A questionnaire was developed to collect data from respondents working for the three-main public mobile telephone network operators: Zain, Orange and Umniah. The Statistical Package for Social Sciences program was used in the descriptive analysis of the responses. The results show that all four success factors have a high level of impact, separately and together, on e-governance in Jordan. Cost saving has the highest impact, followed by scalability, availability and flexibility. Based on these results, the study makes some suggestions for further research that could enrich understanding of the implementation of cloud computing and its effect on e-governance in Jordan.

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1. INTRODUCTION

E-governance has been defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as follows: E-Governance involves new styles of leadership, new ways of debating and deciding policy and investment, new ways of accessing education, new ways of listening to citizens and new ways of organizing and delivering information and services-Governance can bring forth new concepts of citizenship, both in terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen [1]. E-government is an application of e-governance [2], and Jordan was one of the first countries in the Middle East to start to implement the latest technologies in its e-government program. [3]

During the last few years, the use of cloud computing has grown rapidly in the IT industry around the world, and Jordan is no exception. One of the key users of cloud computing in Jordan is the telecommunication sector. Companies in this sector provide services to citizens and to other companies, so for the purposes of this study it seemed reasonable to select telecommunication companies as the sample for this study that seeks to examine whether success factors for implementing cloud computing in Jordanian telecommunication companies have an effect on e-governance in Jordan. This study focuses on four success factors for implementing cloud computing technology: availability, cost saving, flexibility and scalability. The study also attempts to identify the benefits of adopting cloud computing technology for the delivery of e-government services in Jordan. This study investigates the impact of success factors for implementing cloud computing technology in Jordanian telecommunication companies on e-governance in Jordan.

Cloud computing provides added value to the companies that use it. The three main Jordanian telecommunication companies, Zain, Orange and Umniah, have recently adopted this technology in order to meet customers' needs and obtain the benefits of cloud computing.

There are four main types of cloud computing: public, private, community and hybrid. A community cloud is a kind of cloud wherever a third party delivers facilities to customers thru the Internet, then somewhere individually user takes an access machinery provided by the third party. A public cloud is a cost-effective method of providing a range of services. A private cloud has many benefits over the public cloud depending upon the service required. In addition, in a private cloud the data and processes are managed by the organization itself, which provides a better and more controlled infrastructure for enhanced security. Finally, a hybrid cloud is a combination of the private, public and community cloud models. It has maximum functionalities as compared to the other types of cloud. In a hybrid cloud, non-critical information is handled by the public cloud while critical information and processing is done by the organization in its own controlled private cloud [3-5].

There are three main ways of delivering services in a cloud environment: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). In IaaS, infrastructure resources such as processing power, storage and networks, and even the OS and applications are provided in the cloud as a service so that clients can use them when they need to [3-6].

2. LITERATURE REVIEW

There are several studies that are of particular relevance to this study. The most important among these studies are discussed below.

Masud et. al. [9] described how cloud computing can be helpful for the electronic form of governance. The author also described the role of that cloud computing standards and architectures can play in framing a good e-governance strategy to realize e-government. Cloud computing can be classified according to delivery models into three main types; SaaS, PaaS and IaaS. Cloud computing can be classified according to deployment models into three main types; public cloud, private cloud, Community cloud and hybrid cloud.

Then, in Amman, on 2014 the Ministry of Information and Communications Technology (MoICT) in Jordan launched of a entities' server hardware procurement cycle from over four months to less than one day. The platform will also enhance government entities' utilization of server hardware from the industry average of approximately 15% to more than 90%. Furthermore, by centralizing its operations through a unified data center the Government of Jordan will be able to ensure that its server power is maximized [10]. In light of the above developments, this study is both timely and relevant.

3. METHODOLOGY
3.1. Sampling

The three main Jordanian public mobile telephone network operators were selected as the sample of this study: Zain, Orange and Umniah. A random sample of 200 employees from among these companies was selected to receive the questionnaire. A total of 152 questionnaires were returned, eight of which were eliminated because of missing data. This left 144 usable questionnaires for the analysis, which represents a 72% response rate.

3.2. Instrument

The paper instrument based on theoretical literature within cloud computing, e-governance concept and the surveys used in literature [11].

The first part of the questionnaire designed to gather demographic data about the employees, namely, sex, age and work experience. The second part of the questionnaire was developed to measure the independent and dependent variables. The questionnaire consists of 16 statements (items): Items 1 to 4 measured availability. 5 to 8 measured cost saving, 9 to 12 measured flexibility and 13 to 16 measured scalabilities as success factors for the implementation of cloud computing. The respondents were asked to indicate their level of agreement with the statements according to a five-point Likert-type scale (1 to 5). A weighted mean of 3.00 and above was set as the cut-off point for the level of agreement.

3.2.1. Validity

The questionnaire was reviewed by professors who are experts in the field of management in order to verify the validity of the items. Some items (4, 5, 8, 9, 12, 13, 14 and 15) were rewritten in accordance with their comments.

3.2.2. Reliability

Alpha (α) coefficient used to measure the reliability with internal consistency of the variables. As shown in Table 1, the coefficient (α) values ranged from 0.789 to 0.915, which indicates that the study instrument had reliability, according to [12].

Table 1. A coefficient of reliability statistics

Reliability statistics	Cronbach's alpha	No. of items
for availability	.897	2
for cost saving	.915	2
for flexibility	.789	2
for scalability	.854	2
for availability, cost saving, flexibility and scalability on e-governance	.895	5

4.   FINDINGS
4.1.   Descriptive Analysis

In Table 2, the results of the descriptive analysis of the demographic characteristics showed that 58.3% of the respondents were male and 41.7% were female. This reflects the general situation in the private sector in Jordan where the majority of employees are male, which is related to the culture of the country. As for their age, the vast majority of the respondents were aged 26–40 years old (87.5%). Most of the respondents had 6–10 years' work experience (40.3%).

Table 2. The majority of employees

		Frequency	Percent	Valid Percent	Cumulative Percent
	Sex				
Valid	Male	84	58.3	58.3	58.3
	Female	60	41.7	41.7	100.0
	Total	144	100.0	100.0	
	Age				
Valid	18–25 years old	15	10.4	10.4	10.4
	26–40 years old	126	87.5	87.5	97.9
	More than 40	3	2.1	2.1	100.0
	Total	144	100.0	100.0	
	Work Experience				
Valid	1–5 years	38	26.4	26.4	26.4
	6–10 years	58	40.3	40.3	66.7
	More than 10	48	33.3	33.3	100.0
	Total	144	100.0	100.0	

In Table 3, the results show that the achievement factor for implementing cloud computing in telecommunication companies that was ordered the first by the defendants in relations of its outcome on e-governance in Jordan was saving cost with a mean value equal 4.2500, after that by scalability with value of 4.1406, also availability with mean value of 4.1042) and the flexibility have value of 3.5833.

Table 3. The level of success factors for implementing cloud computing in telecommunication companies on e-governance in Jordan.

Success factor	Mean	Standard deviation (SD)	Rank	Level
Cost saving	4.2500	.71693	1	High
Scalability	4.1406	.92872	2	High
Availability	4.1042	.77126	3	High
Flexibility	3.5899	.53546	4	Medium
Overall impact on e-governance	3.9956	.55170		High

4.2. Hypotheses Testing

Based on the objectives and aim of this paper, the following hypotheses formulated as:

H0: There is no significant impact of success factors for implementing cloud computing in telecommunication companies on e-governance in Jordan.

Sub-hypotheses:

H01: There is no significant impact of availability as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan.

H02: There is no significant impact of cost saving as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan.

H03: There is no significant impact of flexibility as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan.

H04: There is no significant impact of scalability as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan.

Table 4. Model Summary

	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
H0	1	.987a	.973	.973	.09109
H01	1	.860a	.739	.737	.28279
H02	1	.873a	.761	.760	.27050
H04	1	.652a	.425	.421	.41964

a. Predictors: (Constant), Scalability, Flexibility, Availability, Cost saving

Table 5. ANOVA

	Model		Sum of Squares	Df	Mean Square	F	Sig.
H0	1	Regression	42.372	4	10.593	1276.568	.000b
		Residual	1.153	139	.008		
		Total	43.525	143			
H01	1	Regression	32.169	1	32.169	402.264	.000b
		Residual	11.356	142	.080		
		Total	43.525	143			
H02	1	Regression	33.135	1	33.135	452.849	.000b
		Residual	10.390	142	.073		
		Total	43.525	143			
H03	1	Regression	18.519	1	18.519	105.162	.000b
		Residual	25.006	142	.176		
		Total	43.525	143			

a. Dependent variable: E-governance
b. Predictors: (Constant), Scalability, Flexibility, Availability, Cost saving

Table 6. Coefficient

	Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
H0	1	(Constant)	.471	.059		7.942	.000
		Availability	.199	.018	.278	11.241	.000
		Cost saving	.259	.019	.336	13.376	.000
		Flexibility	.189	.018	.183	10.615	.000
		Scalability	.225	.011	.379	19.601	.000
H01	1	(Constant)	1.472	.128		11.495	.000
		Availability	.615	.031	.860	20.057	.000
H02	1	(Constant)	1.142	.136		8.399	.000
		Cost saving	.671	.032	.873	21.280	.000
H03	1	(Constant)	1.587	.237		6.686	.000
		Flexibility	.672	.066	.652	10.255	.000
H04		(Constant)	1.910	.112		17.032	.000
		Scalability	.504	.026	.848	19.054	.000

a. Dependent variable: E-governance

1) H0: There is no significant impact of success factors for implementing cloud computing in telecommunication companies on e-governance in Jordan. In Table 5, it can be seen that the f value is (1276.568) with (0.00) significance. This significance value is less than (0.05), ($\alpha \leq 0.05$). As shown in the model summary, combined together the success factors (availability, flexibility, scalability and cost saving) for implementing cloud computing in telecommunication companies explain (97.3%) of the

variance in e-governance based on the R square value. Thus, these four success factors have a significant impact on e-governance in Jordan. Table 6 shows the (t) values for availability, flexibility, scalability and cost saving are 11.241, 10.615, 19.601 and 13.376, respectively. The significance value of (t) is (0.000) for all of them, which is less than the level of significance (0.05). Therefore, improved the in-height coefficients of (Beta) by values of 0.277, 0.183, 0.379 and 0.336, individually. regarding the overhead results, null hypothesis container rejected also alternative hypothesis canister accepted, specifically that nearby is a significant impact of achievement factors for applied cloud computing technology at telecommunication companies within e-governance in Jordan.

2) H01: There is no significant impact of availability as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan, as shown in Table 4.

3) The ANOVA results in Table 5 show that the value of (f) is equal to (402.264). Similarly, the significance value of f is equal to 0.00, so it is less than the close of significance (0.05). Furthermore, from the summary for Model 1, according to the R square value, availability as a success factor for the implementation of cloud computing explains (73.9%) of the variance in e-governance. This indicates the presence of a significant effect of availability as a success factor for implementing cloud computing on e-governance in Jordan. Clearly can show in Table 6, availability can success factor for the application of cloud computing in telecommunication companies takes an effect on e-governance with (t) value has 20.057 and with significance of 0.000 value. This improved the tall coefficient in Beta value to equal 0.860.

4) H02: There is no significant impact of cost saving as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan. According to the R square value in the model summary below, cost saving explains (76.1%) of the variance in e-governance, which indicates the presence of a significant effect of cost saving as a success factor for implementing cloud computing on e-governance in Jordan. The value of (t), as shown in Table 6 ,for cost saving is factor success for implements of cloud computing in telecommunication companies in Jordan as a 21.280 and the (t) value has a significance with 0.000, this indicate that is a less than significance level of 0.05. also, it enhanced the coefficients of the Beta values to 0.873. Based on results above, null hypothesis could be rejected also the hypothesis could be accepted, this indicate that the significant impact of cost saving is a success factor in cloud computing study in telecommunication companies within e-governance in Jordan.

5) H03: There is no significant impact of flexibility as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan. The results of the ANOVA in Table 5 show that the value of (f) is equal to (105.162). Also, the value of the significance of f is (0.00), which is less than the level of significance (0.05). In addition, the model summary data shows that flexibility explains (42.5%) of the variance in e-governance according to the R square value. This indicates there is a significant effect of flexibility as a success factor for implementing cloud computing on e-governance in Jordan. Table 6 is shown that the flexibility is a success factor for using cloud computing within telecommunication companies and has good value on e-governance this due to (t) have value of (10.255) also have a significance 0.00 values, this could have enhanced the high coefficient of Beta to be 0.65 value. Consequently, the null hypothesis can be rejected, and the alternative hypothesis can be accepted, namely, that there is a significant impact of flexibility as a success factor for implementing cloud computing in telecommunication companies on e-governance in Jordan.

6) H04: There is no significant impact of scalability as a success factor for implementing cloud computing technology in telecommunication companies on e-governance in Jordan. It can be seen in Table 5 that the value of (f) is equal to (363.057). Also, f has a significance value of (0.00), which is less than the level of significance (0.05). In addition, the results in the model summary show that, based on the R square value, scalability explains (71.9%) of the variance in e-governance, which indicates there is a significant effect of scalability as a success factor for implementing cloud computing on e-governance in Jordan. Furthermore, the above finding that scalability as a success factor for implementing cloud computing in telecommunication companies has an impact on e-governance is supported by the results in Table 6 which show that the value of (t) is (19.054) with a significance value of (0.000), which is less than the significance level (0.05). This enhanced the high coefficient of Beta (0.848). Regarding the results above, null hypothesis could be rejected also the hypothesis could be accepted, here is significant impact of scalability by way of a success factor when implementing cloud computing within the telecommunication companies on e-governance study in Jordan.

5.   CONCLUSION AND LIMITATIONS

From the results of the analysis above, there is a high-level impact of success factors for implementing cloud computing in telecommunication companies on e-governance in Jordan. Cost saving is ranked in first place, scalability in second place, availability in third place and flexibility in fourth place. Also, there is a significant impact of availability as a success factor for implementing cloud computing technology in telecommunication companies on e-governance in Jordan. Furthermore, there is a significant impact of cost saving as a success factor for implementing cloud computing technology in telecommunication companies on e-governance in Jordan. a significant impact of flexibility as a success factor for implementing cloud computing technology is exist in telecommunication companies on e-governance in Jordan. And also we can see a significant impact of scalability as a success factor for implementing cloud computing technology in telecommunication companies on e-governance in Jordan.

It should be noted that the study is subject to some limitations. These could be addressed in future research. On the first, telecommunication companies offer services to many citizens with companies thus study choose the telecommunication companies as sample of attention to inspect the aids of the implementation in cloud computing within e-governance in Jordan, Though, this companies will from one area, thus other companies of computer in Jordan can bring cloud computing could be engaged as studying samples for novel research studies. Secondly, this study examined only four of the many identified benefits of implementing cloud computing.

REFERENCES

[1]   Adeyemo, A., E-government implementation in Nigeria: An assessment of Nigerias global e-gov ranking. Journal of Internet and Information Systems, 2011. 2(1): p. 11-19.
[2]   Palvia, S.C.J. and S.S. Sharma. E-government and e-governance: definitions/domain framework and status around the world. in International Conference on E-governance. 2007.
[3]   Al-Shboul, M., et al., Challenges and factors affecting the implementation of e-government in Jordan. Journal of Software Engineering and Applications, 2014. 7(13): p. 1111.
[4]   Gharehchopogh, F.S. and S. Hashemi, Security challenges in cloud computing with more emphasis on trust and privacy. International Journal of Scientific & Technology Research, 2012. 1(6): p. 49-54.
[5]   Reyes, H., J. Ramírez, and A. Schuhbauer, Evaluación de la pesquería de langosta espinosa en la Reserva Marina de Galápagos. 2013.
[6]   Bulusu, S. and K. Sudia, A Study on Cloud Computing. Security Challenges,(Master's Thesis, School of Computing. Blekinge Institute of Technology), 2012.
[7]   Hashemi, S., K. Monfaredi, and M. Masdari, Using cloud computing for e-government: challenges and benefits. International Journal of Computer, Information, Systems and Control Engineering, 2013. 7(9): p. 596-603.
[8]   Alshomrani, S. and S. Qamar, Cloud based e-government: benefits and challenges. International Journal of Multidisciplinary Sciences and Engineering, 2013. 4(6): p. 1-7.
[9]   Masud, M.A.H., J. Yong, and X. Huang. Cloud computing for higher education: a roadmap. in Computer Supported Cooperative Work in Design (CSCWD), 2012 IEEE 16th International Conference on 2012. IEEE.
[10]   Alsharafat, S., B.M. Alfawwaz, and A.M. Al-shatnawi, Jordanian Cloud-Government between Implementation and Challenges. International Journal Of Computer Applications, 2014. 102(5).
[11]   Mohammed, F., et al., Cloud Computing Fitness for E-Government Implementation: Importance-Performance Analysis. IEEE Access, 2018. 6: p. 1236-1248.
[12]   Tian, J., et al., CHF-PROM: validation of a patient-reported outcome measure for patients with chronic heart failure. Health and quality of life outcomes, 2018. 16(1): p. 51.