Cloud Computing Perceived Importance in the Middle Eastern Firms: The Cases of Jordan, Saudi Arabia and United Arab Emirates from the Operational Level *

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Abstract

Firms need cloud computing adoption for strategic and competitive goals, generating business value, and at last gaining competitive advantage. This study reviews the literature regarding cloud computing and IT governance, and presents a research model along with its hypotheses formulation to examine the factors impacting cloud computing perceived importance in several Arab firms, specifically Jordan, Saudi Arabia and United Arab Emirates by using the integration of Technology Acceptance Model (TAM) model and Technology-Organizational-Environmental (TOE) framework as adapted from Gangwar et al. (2015) study. The collected data analyzed using the structural equation modeling technique. This is as an attempt to present valuable and practical guidelines to IT managers and business managers to realize the resources and conditions necessary to comprehend the potential values of their IT investments in the existence of cloud computing capabilities, which in turn will facilitate the trade systems among firms in the Middle Eastern region. This is by allowing sharing specialized documents, tracking their supply chain management systems, and enabling electronic collaborations. The study found that relative advantage, compatibility, complexity, organizational readiness, top management commitment, and training and education as important variables for impacting cloud computing adoption using perceived ease of use and perceived usefulness as mediating variables. The model explained 61%, 63%, and 74% of cloud computing adoption for perceived usefulness, perceived ease of use, and perceived importance respectively.

Keywords: Cloud Computing Adoption, IT Governance, Technology Acceptance Model, Technology-Organizational-Environmental, Middle East, Trade Systems.

* This research was conducted under the support of the WTO-Chair Programme at the University of Jordan

1. Introduction

Cloud computing is a general term that provides services over the Internet. Security and privacy are the two main issues that cloud computing providers consider. Saravana et al. (2015) argued that security issues play a vital role in cloud computing. The cloud services which allow people accessing to their documents whenever they are concern the ways in which that services will be secured. Also, the cloud provides may use customer data, the trade-off between extensibility and security responsibility, virtualization, and the different approaches to provide security and privacy may generate integration challenges (Siani, 2011; Al-Saiyd and Sail, 2013; Lemoudden et al., 2013; Shahzad, 2014; Sari and Kurniawan, 2015; Virgile and Yu, 2015). According to Saravana et al. (2015), the revenue of cloud service providers had been increased year by year as companies all around the world is connected through open

networks, and these networks are used to transmit information electronically. Consequently, it grows fast.

In addition, organizations consider IT governance to be one of the top influential factors for creating business value and gaining competitive advantage. In 2009, a research group proposed a theoretical model for IT governance and IT business alignment (Beimborn et al., 2009). The proposed model was based on the suggestion by Van Grembergen et al. (2004) that the cores of IT governance mechanism are the strategic alignment and the operational alignment. The authors showed theoretically from governance prospective that combining the key finding from IT governance, IT business and IT value research is the role of top executive support and operational alignment. Executive support derived and strongly correlated with strategy alignment, operational alignment, and IT governance tools and indirectly with business process performance. Moreover, the authors indicated empirically the IT governance is mediated the by strategic and operational alignment.

Several researchers (e.g. Weinhardt et al., 2009; Lombardi and Dipietro, 2011; Marston et al., 2011; Furuichi and Yamada, 2014; Olaru, 2014; Sinjilawi et al., 2014; Simamora and Kom, 2015) emphasized that one of the most essential advantages offered by cloud computing is the reduced cost. Cloud computing radically lowers the cost of entry especially for smaller firms trying to benefit from compute-intensive business analytics that were solely available to the largest ones. Alijani et al. (2014), who defined cloud computing as the process of allowing users to access available services through the internet, tried to help small businesses to decide whether or not cloud computing is efficient for their operation. They focused on the benefits that would be gained if small businesses use the system and they have mentioned the special characteristics of such computing. A survey was developed to collect and analyze data, the results show that 59% of the small businesses that use cloud computing are satisfied, 34% determined that cloud computing a solid information management facility, and 55% agreed that is cost effective.

According to Buyya et al. (2009), cloud is a parallel and distributed computing system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established throughout cooperation between the service provider and consumers. Erturk and Maharjan (2014) suggested that cloud computing and virtualization are new but indispensable components of computer engineering and information systems. The study related to this article indicated that teaching cloud computing reduces overall IT costs through the consolidation of systems besides results in reduced loads and energy savings in terms of the power and cooling infrastructure. Indeed, Guo and Zheng (2015) stated that users of cloud services themselves relying on some internet information resources which lie on some nodes like computing resources, software resources, data resources and management resources. These services should be allocated based on a demand driven, user dominant, on-demand services, no centralized control, and users do not care where the server. Thus, the parallel computing and virtualization technology has become the core support technology after the concept of cloud computing was proposed.

However, potential challenges related to cloud computing occur such as security, service availability, lack of interoperability standards, complex structure and compatibility issues, cloud computing adoption, and competitiveness of cloud computing and trading partner support for cloud services (Feuerlicht et al., 2011; Low et al., 2011; Lin and Chen, 2012; Alshamaila et al., 2013; Gangwar et al., 2015). Furthermore, since both of TAM model and TOE framework are considered widely in the literature related to technology adoption studies for successfully predicting and explaining users' intentions to adopt existing and new technologies, this research used them to examine the determinants of cloud computing adoption. Indeed, TAM and TOE are considered as commonly used models for measuring acceptance level of customer for emerging systems (for detailed information regarding TAM and TOE, please refer to Gangwar et al., 2015). Although many studies examine the applicability and convergence of TAM in the literature review and meta-analysis, there is no study attempt to use TAM in a co-citation analysis. Therefore, Hsiao and Yang (2011) used a co-citation analysis to study its intellectual structure and determine the main trends of TAM. Based on certain statistical analyses which include factor analysis, multidimensional scaling, and clustering analysis; three main trends were identified: task-related system, e-commerce systems, and hedonic systems. The authors expected that these findings may offer benefits for both academic and practical fields and considered as benchmarks for future research of TAM field to classify the emerging new technologies to which trend are follow. Consequently, the current research examined several technological, organizational, and environmental variables which will impact the adoption of cloud computing in firms by implementing both TAM and TOE models. Moreover, since the Internet usage and its applications such as the implementation of cloud computing tools smooth the progress of intra communication to lessen trade and investment impediments and boost intra-region trade systems (Gangwar et al., 2015); this study examined factors impacting cloud computing perceived importance in several Arab firms, exclusively in Jordan, Saudi Arabia and United Arab Emirates. In doing so, the study will assist policy makers, and business managers to realize the resources and conditions necessary to comprehend the potential values of their IT investments in the existence of cloud computing capabilities, which in turn will facilitate the trade systems among the Arab countries.

This paper is structured as follows. It begins with the research model regarding cloud computing and its hypothesis. Then, the research methodology used for the study is provided. Next, data analysis techniques and the conclusions are then addressed.

2. Research Model

In general, executives are unable to influence each other very well (Williams and Miller, 2002). CIOs (Chief Information Officers) are the head of technology and the source of technology innovation. A study was conducted to understand how Irish CIOs persuade the technology innovation and IT-business alignment within an organization (Enns et al., 2012). The results proved that most CIOs persuade other executives to maintain technology innovation that improve IT-Business alignment. On the other hand, some other CIOs were unable to do so, which increase the gap between CIOs and executives. Based on the results of their study, the authors suggested some important behaviors and practices for CIOs to decrease and increase the connection. They recommend CIOs to encourage technological innovations

and improve IT-business alignment with other executives by maintaining partner wisely, gathering the right data, and soliciting others to influence and communicating appropriately. Consequently, top management support is crucial when adopting new technologies such as the use of cloud computing applications. Cloud computing is an attractive model to companies; it eliminates the cost and the required small resources to start with. Armbrust et al. (2010) defined cloud computing as the applications delivered as services over the Internet and the hardware and system in the data centers that supply these services in which the services themselves referred to as Software as a Service (SaaS). According to the National institute of standards and technology (NIST), the definition of cloud computing has been recognized as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction (Subashini and Kavitha, 2011; Shahzad, 2014).

According to Karajeh et al. (2014), Guo and Zheng (2015) and Saravana et al. (2015), cloud computing offers many services such as infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS). The capability provided to the customer of IaaS is raw storage space, computing, or network resources with which he/she can run and implement an operating system, applications, or any software that they select. In PaaS, the cloud providers supply the hardware and a toolkit in which a number of supported programming languages help to build higher level services. In the case of SaaS, the applications are usually easily reached through a thin client interface, such as a web browser. Joseph et al. (2014) stated that cloud computing types include private, public, hybrid, and community. The private cloud is devoted to a single organization in providing the different services necessary for its working. Cloud stack, Rackspace, Red Hat cloud are examples of private cloud providers. The public cloud is meant for organizations sharing their resources or diverse infrastructure, softwares and platforms with the public, besides sharing of resources and storage could take place over the internet. Some of the public cloud service providers include Bluelock, Microsoft, Google, HP and Dell Inc. Hybrid cloud model arranges the use of both public and private cloud, which includes scaling across various clouds. The exploitation of hybrid cloud may well necessitate the need for an on-premise and off-premise resources. The hybrid cloud providers include Voxen, VMware and Western Digital. Community cloud is defined as a subclass of public cloud in which various resources and services like softwares, platforms and infrastructures can be shared among various users. Intel Corporation and Cisco are some of the service providers for community cloud.

According to cloud computing characteristics, cloud computing has been adopted for many purposes (Sehgal et al., 2011; Sandholm and Lee, 2014; Varalakshmi et al., 2014; Kim and Lee, 2015). For instance, managing the labs to assist maintenance and network management. Thus, Ibrahim and Ameen (2015) presented the possibilities of using cloud computing as a solution to expand work efficiency at Taiz University Computer Center and Information Technology labs which equipped with hardware and software resources; in the hope that their results could be the guideline for all universities in Yemen to use the cloud computing. The researchers found that cloud computing impacts managing the resources for Taiz University in numerous areas such as daily education operations, supporting staff, and distributed management system which in turn can considerably reduce load, leveraging efficiencies. In

addition, students can work on the cloud, cooperate with their team members, share knowledge, and access their homework anywhere, at home or from the labs.

Another cloud computing application suggested the development of information technology helped to improve and facilitate the water distribution system and here the researchers (i.e. Arango et al., 2014) focused on the use of cloud computing to support decision making in water distribution system. The characteristics of cloud computing was the main factoring in development the water distribution system. In addition to the wide range of benefits, cloud computing provides four deployment models to the water companies, and they can select the model that better suits their requirements. Private cloud: The cloud infrastructure is provisioned for exclusive single organization; Community cloud: Cloud infrastructure provisioned for exclusive specific community of consumers. Public cloud: Infrastructure provisioned for open use by the general public. Hybrid cloud: Composition of two or more distinct cloud infrastructures (private, community, or public). For the case of the water industry, hybrid cloud approach has several advantages among others because of the flexibility it provides to keep information inside the proprietary IT infrastructure of companies besides using some public infrastructure.

Caytiles and Lee (2012) and Shahzad and Hussain (2013) argued that with the broad development in mobile applications and advancements in cloud computing, few years later a new growth happened in the form of mobile cloud computing by providing a platform where mobile users make use of cloud services on mobile devices. However, the users of mobile cloud computing are still less than expectations because of the associated risks in terms of security and privacy issues such as data theft risk; privacy of data belongs to customers; violation of privacy rights; loss of physical security; handling of encryption and decryption keys; security and auditing issues of virtual machines; lack of standard to ensure data integrity; and services incompatibility because of different vendors involvement. Also, there are some attacks which are probable at end user mobile device such as device data theft; virus and malware attacks via wireless devices; and mis-use of access rights. Nevertheless, some common information security issues of cloud computing could be used as a protection methods including system security of server and database; networking security; user authentication; data protection; and system and storage protection techniques.

However, as the current research aims to examine the factors impacting cloud computing perceived importance in some Arabian firms, exclusively Jordan, Saudi Arabia and United Arab Emirates by using the integration of Technology Acceptance Model (TAM) model and Technology-Organizational-Environmental (TOE) framework as adapted from Gangwar et al. (2015) study (Figure 1 displays the research model), the hypotheses are formalized as below:

H1: The higher the level of relative advantage, the greater influence on perceived usefulness.
H2: The higher the level of relative advantage, the greater influence on perceived ease of use.
H3: The higher the level of compatibility, the greater influence on perceived usefulness.
H4: The higher the level of compatibility, the greater influence on perceived ease of use.
H5: The lower the level of complexity, the greater influence on perceived usefulness.
H6: The lower the level of complexity, the greater influence on perceived ease of use.

H7: The higher the level of organizational competency, the greater influence on perceived usefulness.
H8: The higher the level of organizational competency, the greater influence on perceived ease of use.
H9: The higher the level of top management support, the greater influence on perceived usefulness.
H10: The higher the level of top management support, the greater influence on perceived ease of use.
H11: The higher the level of training and education, the greater influence on perceived usefulness.
H12: The higher the level of training and education, the greater influence on perceived ease of use.
H13: The higher the level of ease of use, the greater influence on perceived usefulness.
H14: The higher the level of ease of use, the greater influence on cloud computing perceived importance.
H15: The higher the level of perceived usefulness, the greater influence on cloud computing perceived importance.

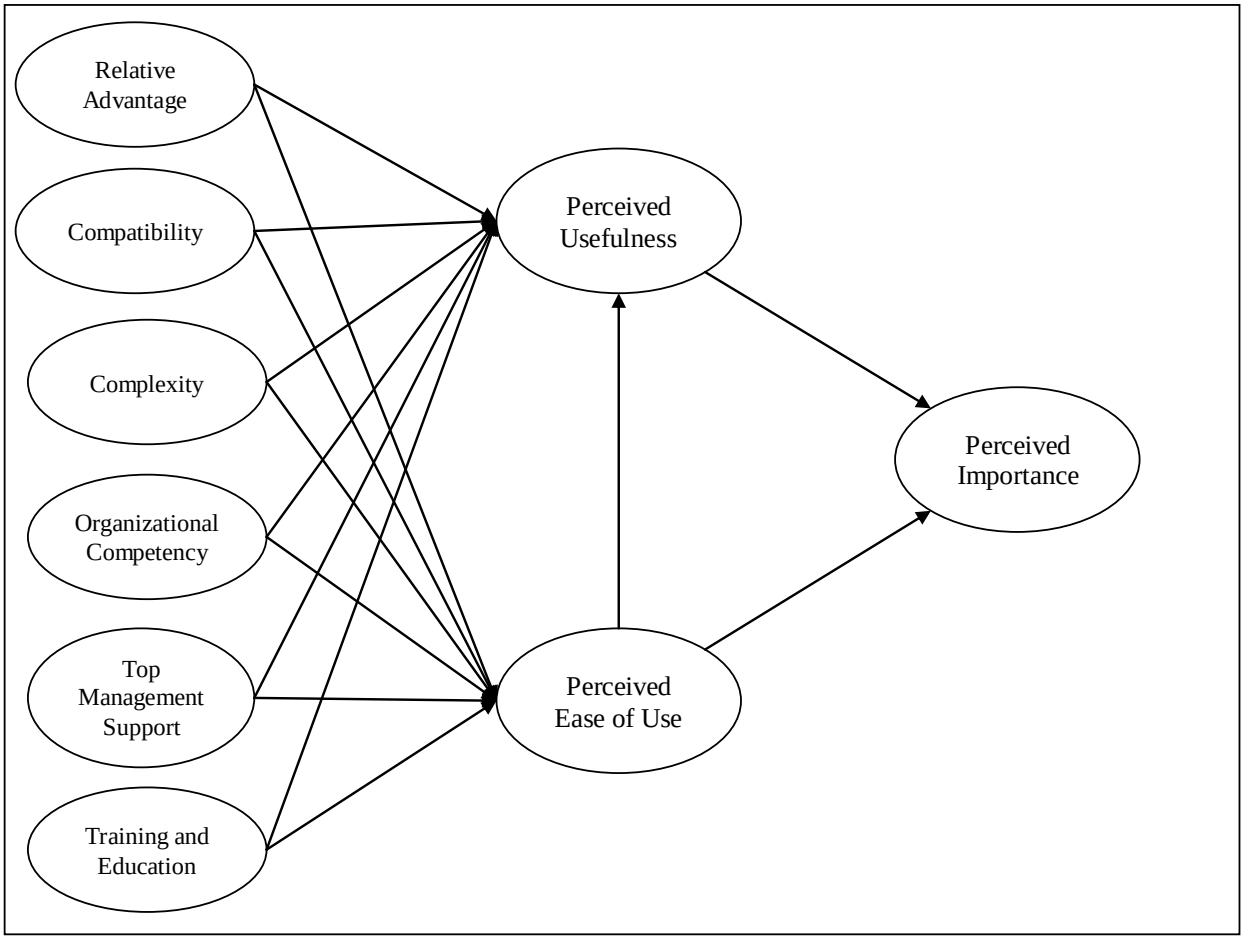

Figure 1: Research Model

3. Research Methodology

Indeed, the goal of the research is to examine factors impacting cloud computing adoption by implementing the integration of TAM model and TOE framework as adapted from Gangwar et al. (2015) and Terzis et al. (2013). Nine constructs were measured using closed-end five-point Likert scale items, with scales ranging from 1= "strongly disagree" through 3= "neither agree nor disagree" to 5= "strongly agree". Table 1 shows the measured constructs and the items measuring each construct.

Table 1: Constructs and Measurement Items

Construct	**Measurement Items**
Relative Advantage (RA)	RA1: By using cloud computing, we pay only for what we use. RA2: By using cloud computing, we are able to scale up our requirement when required. RA3: By using cloud computing, we can access information from any time from any place. RA4: By using cloud computing, we do not need to administer our IT infrastructure. RA5: Performance of cloud services does not decrease with growing user base. RA6: By using cloud computing, we can access share resources placed on cloud. RA7: By using cloud computing, we do not need to maintain our IT infrastructure.
Compatibility (CM)	CM1: In case of any incompatibility issue, we ask cloud service provider to recommend integrated services. CM2: Cloud services are compatible with existing technological architecture of our company. CM3: Customization in cloud-based services is easy. CM4: The changes introduced by cloud computing are consistent with existing practices in our company. CM5: Cloud computing development is compatible with our firm's existing format, interface, and other structural data. CM6: We incur re-training cost in case of non-customizable cloud-based services. CM7: There is no difficulty in importing applications/ data from cloud services. CM8: There is no difficulty in exporting applications/ data to cloud services.
Complexity (CY)	CY1: Cloud computing is flexible to interact with. CY2: Using cloud computing exposes me to the vulnerability of computer breakdowns and loss of data. CY3: When I use cloud computing, I find it difficult to integrate my existing work with the cloud-based services. CY4: When I perform many tasks together, using cloud computing

	takes up too much of my time.
Organizational Competency (OC)	OC1: My company hires highly specialized or knowledgeable personnel for cloud computing. OC2: We have sufficient technological resources to implement cloud computing – unrestricted access to computer. OC3: We have sufficient technological resources to implement cloud computing – high bandwidth connectivity to the internet. OC4: We allocate a percent of total revenue for cloud computing implementation in the company.
Top Management Support (TM)	TM1: My top management exhibits a culture of enterprise wide information sharing. TM2: The company's top management provides strong leadership and engages in the process when it comes to information systems company. TM3: My top management is likely to consider the adoption of cloud computing as strategically important. TM4: My top management is willing to take risks involved in the adoption of cloud computing.
Training and Education (TE)	TE1: My level of understanding was substantially improved after going through the training program on cloud computing. TE2: My company provided me complete training in using cloud computing. TE3: The training gave us confidence in use of cloud computing.
Perceived Usefulness (PU)	PU1: Using cloud computing enables me to manage business operation in an efficient way. PU2: Using cloud computing enables me to increase business productivity. PU3: Using cloud computing enables me to accomplish my organizational task more quickly. PU4: The use of cloud computing services improves the quality of business operation. PU5: Using cloud computing advances my competitiveness.
Perceived Ease of Use (PE)	PE1: The procedure of using cloud computing is understandable. PE2: It is easy for me to learn using the cloud computing. PE3: It is easy to make use of cloud computing.
Perceived Importance (PI)	PI 1: I believe that cloud computing is essential for facilitating the trade systems with our partners. PI 2: I believe that cloud computing increases our performance by facilitating the trade systems with our partners. PI 3: I believe that cloud computing brightens our future by facilitating the trade systems with our partners.

Indeed, online and offline survey questionnaires were used for data gathering from the firms those have implemented cloud computing, specifically from top and middle-level IT managers, and IT employees from the operational level as well. Thus, judgmental sampling technique was

used in this research. Before implementing the survey, the instrument was reviewed by five lecturers who are specialized in the Management Information Systems (MIS) discipline in order to identify problems with wording, content, and question ambiguity. After some changes were made based on their suggestions, the modified questionnaire was piloted on four employees who are working in AL Moasron Trading firm, in Jordan. Based on the feedback of this pilot study, minor edits were introduced to the survey questions, and the questionnaires were distributed to the participants. As per ethics policies, all potential participants were briefed about the nature of the work and were requested to provide explicit approval. Three Arab firms that operate in the telecommunication industry, which use cloud computing services, approved to participate in the study; and two of them assured that their identities will not be identified, based on their requests, for confidentiality purposes. AL Moasron Trading firm from Jordan, which responds offline to the surveys, and firms X, and Y from Saudi Arabia and United Arab Emirates respectively, which filled the surveys online. These three firms were chosen as they use cloud computing since few firms exploit such new services in the Arab world, and most important they accepted to participate in the study.

Table 2: Demographic Data for Respondents

Category	**Frequency**	**Percentage %**
Name of the Company		
Gender		
Male	218	66.2
Female	111	33.8
Total	*329*	*100*
Age		
20 years- less than 30	120	36.5
30 years - less than 40	188	57.1
40 years - less than 50	15	4.6
50 years and above	6	1.8
Total	*329*	*100*
Years of Experience		
5 years - less than 10	102	31.0
10 years - less than 15	215	65.4
15 years and above	12	3.6
Total	*329*	*100*

As showed in Table 2, 66.2% of the respondents were males; 63.5% of them more than 30 years old; and most of them experienced with 10 years and more.

4. Research Results

4.1. Descriptive Statistics

All the 41 items were tested for their means, standard deviations, skewness, and kurtosis. Indeed, in order to describe the responses and thus the attitude of the respondents toward each question they were asked in the survey, the mean and the standard deviation were estimated. While the mean shows the central tendency of the data, the standard deviation measures the dispersion which offers an index of the spread or variability in the data (Sekaran and Bougie, 2009). In other words, a small standard deviation for a set of values reveals that these values are clustered closely about the mean or located close to it; a large standard deviation indicates the opposite. The descriptive statistics presented below in Table 3 indicate a positive disposition towards the items. While the standard deviation (SD) values ranged from 0.44442 to 1.03572, these values indicate a narrow spread around the mean. Also, the mean values of all items were greater than the midpoint (2.5) and ranged from 1.9483 (OC1) to 4.1581 (PE2). However, after careful assessment by using skewness and kurtosis, the data were found to be normally distributed. Indeed, skewness and kurtosis were normally distributed since all of the values were inside the adequate ranges for normality (i.e. -1.0 to +1.0) for skewness, and less than 10 for kurtosis (Kline, 2010). Furthermore, the ordering of the items in terms of their means values, and their ranks based on three ranges (i.e. 1– 2.33 low; 2.34 – 3.67 medium; and 3.68 – 5 high) are provided.

Table 3: Mean, Standard Deviation of Scale Items

Construct/Items	Mean	S.D	Order	Rank	Skewness	Kurtosis
Relative Advantage						
RA1:	4.1398	0.76821	1	High	-0.975	1.196
RA2:	4.0182	0.45495	5	High	-0.121	2.780
RA3:	4.0881	0.50740	2	High	-1.117	7.832
RA4:	2.3352	0.70322	7	Medium	0.777	2.106
RA5:	4.0395	0.47010	3	High	-0.402	3.996
RA6:	4.0213	0.48405	4	High	-0.106	2.013
RA7:	2.7720	0.71547	6	Medium	0.416	-0.218
Compatibility						
CM1:	3.0091	0.79052	8	Medium	0.058	-1.210
CM2:	3.2644	0.67624	6	Medium	-0.140	-0.127
CM3:	4.0912	0.73099	1	High	-0.803	1.567
CM4:	3.8815	0.63047	2	High	-0.858	2.292
CM5:	3.6505	0.70452	4	Medium	-1.388	0.924
CM6:	3.1033	0.59080	7	Medium	0.062	0.666
CM7:	3.7751	0.56675	3	High	-1.806	3.255
CM8:	3.6140	0.75299	5	Medium	-1.471	1.467
Complexity						
CY1:	4.0608	0.44442	1	High	0.074	3.025
CY2:	3.2644	0.60484	4	Medium	1.050	1.403
CY3:	3.5289	0.76902	2	Medium	-1.311	0.897
CY4:	3.5228	0.78879	3	Medium	-1.144	0.097

Organizational Competency						
OC1:	1.9483	1.00929	4	Low	0.551	-0.886
OC2:	2.9514	0.93251	2	Medium	0.165	-1.490
OC3:	3.4134	0.70231	1	Medium	-0.566	-0.524
OC4:	2.7204	0.63504	3	Medium	0.457	0.039
Top Management Support						
TM1:	3.9544	0.90782	1	High	-1.066	1.326
TM2:	3.8936	0.96474	2	High	-1.528	2.356
TM3:	2.7143	0.78698	3	Medium	0.704	-0.566
TM4:	2.6778	1.03572	4	Medium	-0.085	-1.075
Training and Education						
TE1:	2.9878	0.53520	1	Medium	-0.011	1.434
TE2:	2.7052	0.88759	3	Medium	0.667	-1.262
TE3:	2.7143	0.88197	2	Medium	0.592	-1.457
Perceived Usefulness						
PU1:	3.8936	0.63264	2	High	-0.130	0.025
PU2:	3.9271	0.63976	1	High	-0.006	-0.367
PU3:	3.7629	0.82917	3	High	-0.760	0.184
PU4:	3.7325	0.81984	5	High	-0.839	0.425
PU5:	3.7356	0.57380	4	High	-0.020	-0.313
Perceived Ease of Use						
PE1:	4.1033	0.70384	2	High	-0.939	1.776
PE2:	4.1581	0.66667	1	High	-0.998	2.457
PE3:	4.0456	0.65870	3	High	-0.241	-0.037
Perceived Importance						
PI1:	3.8967	0.81242	3	High	-0.121	-0.753
PI2:	3.9514	0.55001	2	High	-0.278	-0.424
PI3:	3.9878	0.57898	1	High	-0.297	-0.358

Structural Equation Modeling (SEM) analysis was employed to estimate the SEM parameters by using the maximum likelihood method. Table 4 shows different types of goodness of fit indices in assessing this study initial specified model. It demonstrates that the research constructs fits the data according to the absolute, incremental, and parsimonious model fit measures, comprising chi-square per degree of freedom ratio (x^2/df), Incremental Fit Index (IFI), Tucker- Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). The researchers examined the standardized regression weights for the research's indicators and found that all indicators had a high loading towards the latent variables. Moreover, since all of these items did meet the minimum recommended value of factor loadings of 0.50; and RMSEA less than 0.10 (Newkirk and Lederer, 2006; Hair et al., 2010; and Kline, 2005, 2010), they were all included for further analysis, except RA4, RA7, CM6, and OC4 which has a loading of 0.271, 0.321, 0.311, and 0.411 respectively, thus

excluded from further analysis. Therefore, the measurement model showed a better fit to the data (as shown in Table 4). For instance, x^2/df was 1.335, the IFI = 0.87, TLI = 0.86, CFI = 0.87; and RMSEA 0.046 indicated better fit to the data considering all loading items.

Table 4: Measurement Model Fit Indices

Model	x^2	df	p	x^2/df	IFI	TLI	CFI	RMSEA
Initial Model	1152.393	743	0.000	1.551	0.86	0.85	0.86	0.049
Final Model	710.220	532	0.000	1.335	0.87	0.86	0.87	0.046

4.2. Measurement Model

Confirmatory factor analysis (CFA) was conducted to check the properties of the instrument items. Indeed, prior to analyzing the structural model, a CFA based on AMOS 20.0 was conducted to first consider the measurement model fit and then assess the reliability, convergent validity and discriminant validity of the constructs (Arbuckle, 2009). The outcomes of the measurement model are presented in Table 5, which encapsulates the standardized factor loadings, measures of reliabilities and validity for the final measurement model.

4.2.1. Unidimensionality

Unidimensionality is the extent to which the study indicators deviate from their latent variable. An examination of the unidimensionality of the research constructs is essential and is an important prerequisite for establishing construct reliability and validity analysis (Chou et al., 2007). Moreover, in line with Byrne (2001) and Pallant (2005), this research assessed unidimensionality using the factor loading of items of their respective constructs. Table 5 shows solid evidence for the unidimensionality of all the constructs that were specified in the measurement model. All loadings were above 0.50, except RA4, RA7, CM6, and OC4, which is the criterion value recommended by Newkirk and Lederer (2006). These loadings confirmed that 37 items were loaded satisfactory on their constructs.

4.2.2. Reliability

Reliability analysis is related to the assessment of the degree of consistency between multiple measurements of a variable, and could be measured by Cronbach alpha coefficient and composite reliability (Hair et al., 1998). Some scholars (e.g. Bagozzi and Yi, 1988) suggested that the values of all indicators or dimensional scales should be above the recommended value of 0.60. Table 5 indicates that all Cronbach Alpha values for the nine variables exceeded the recommended value of 0.60 (Bagozzi and Yi, 1988) demonstrating that the instrument is reliable. Furthermore, as shown in Table 5, composite reliability values ranged from 0.85 to 0.93, and were all greater than the recommended value of more than 0.60 (Bagozzi and Yi, 1988) or greater than 0.70 as suggested by Holmes-Smith (2001). Consequently, according to the above two tests, all the research constructs in this study are considered reliable.

Table 5: Properties of the Final Measurement Model

Constructs and Indicators	Std. Loading	Std. Error	Square Multiple Correlation	Error Variance	Cronbach Alpha	Composite Reliability	AVE
Relative Advantage					0.831	0.89	0.61
RA1	0.645	***	0.459	0.245			
RA2	0.644	0.121	0.441	0.271			
RA3	0.621	0.115	0.501	0.209			
RA5	0.641	0.097	0.461	0.288			
RA6	0.568	0.107	0.479	0.210			
Compatibility					0.787	0.93	0.65
CM1	0.798	***	0.562	0.290			
CM2	0.752	0.095	0.532	0.295			
CM3	0.631	0.121	0.442	0.213			
CM4	0.654	0.126	0.516	0.244			
CM5	0.699	0.117	0.612	0.231			
CM7	0.632	0.119	0.619	0.267			
CM8	0.613	0.118	0.562	0.212			
Complexity					0.871	0.92	0.73
CY1	0.822	***	0.532	0.202			
CY2	0.621	0.101	0.522	0.213			
CY3	0.601	0.096	0.578	0.112			
CY4	0.588	0.098	0.469	0.114			
Organizational Competency					0.821	0.87	0.69
OC1	0.723	***	0.542	0.219			
OC2	0.711	0.098	0.587	0.213			
OC3	0.634	0.093	0.521	0.215			
Top Management Support					0.872	0.88	0.65
TM1	0.819	***	0.481	0.287			
TM2	0.732	0.102	0.479	0.273			
TM3	0.601	0.107	0.442	0.212			
TM4	0.511	0.112	0.421	0.223			
Training and Education					0.902	0.85	0.66
TE1	0.727	***	0.489	0.254			
TE2	0.645	0.109	0.521	0.231			
TE3	0.611	0.112	0.449	0.209			
Perceived Usefulness					0.898	0.89	0.62
PU1	0.652	***	0.568	0.253			
PU2	0.621	0.101	0.541	0.238			

PU3	0.611	0.098	0.569	0.211			
PU4	0.654	0.092	0.546	0.269			
PU5	0.598	0.094	0.524	0.211			
Perceived Ease of Use					0.841	0.85	0.64
PE1	0.689	***	0.598	0.258			
PE2	0.665	0.112	0.572	0.232			
PE3	0.618	0.109	0.541	0.226			
Perceived Importance					0.891	0.88	0.72
PI1	0.851	***	0.541	0.231			
PI2	0.762	0.089	0.578	0.221			
PI3	0.649	0.092	0.512	0.217			

As shown above, since the measurement model has a good fit; convergent validity and discriminant validity can now be assessed in order to evaluate if the psychometric properties of the measurement model are adequate.

4.2.3. Content, Convergent, and Discriminant Validity

Although reliability is considered as a necessary condition of the test of goodness of the measure used in research, it is not sufficient (Creswell, 2009; Sekaran, 2003; Sekaran and Bougie, 2013), thus validity is another condition used to measure the goodness of a measure. Validity refers to which an instrument measures is expected to measure or what the researcher wishes to measure (Blumberg et al., 2005). Indeed, the items selected to measure the nine variables were validated and reused from previous researches. Therefore, the researchers relied upon in enhancing the validity of the scale was to benefit from a pre-used scale that is developed from other researchers. In addition, the questionnaire items were reviewed by five instructors of the Business Faculty at the University of Jordan. The feedback from the chosen group for the pre-test contributed to enhanced content validity of the instrument. Moreover, in order to enhance the content validity of the instrument, four employees were asked to give their feedback about the questionnaire, thus confirming that the knowledge presented in the content of each question was relevant to the studied topic.

Furthermore, as convergent validity test is necessary in the measurement model to determine if the indicators in a scale load together on a single construct; discriminant validity test is another main one to verify if the items developed to measure different constructs are actually evaluating those constructs (Gefen et al., 2000). As shown in Table 5, all items were significant and had loadings more than 0.50 on their underlying constructs. Moreover, the standard errors for the items ranged from 0.089 to 0.126 and all the item loadings were more than twice their standard error. Discriminant validity was considered using several tests. First, it could be examined in the measurement model by investigating the shared average variance extracted (AVE) by the latent constructs. The correlations among the research constructs could be used to assess discriminant validity by examining if there were any extreme large correlations among them which would imply that the model has a problem of discriminant validity. If the AVE for each construct exceeds the square correlation between that construct

and any other constructs then discriminant validity is occurred (Fronell and Larcker, 1981). As shown in Table 5, this study showed that the AVEs of all the constructs were above the suggested level of 0.50, implying that all the constructs that ranged from 0.61 to 0.73 were responsible for more than 50 percent of the variance in their respected measurement items, which met the recommendation that AVE values should be at least 0.50 for each construct (Bagozzi and Yi, 1988; Holmes- Smith, 2001). Furthermore, as shown in Table 6, discriminant validity was confirmed as the AVE values were more than the squared correlations for each set of constructs. Thus, the measures significantly discriminate between the constructs.

Table 6: AVE and Square of Correlations between Constructs

Constructs	**RA**	**CM**	**CY**	**OC**	**TM**	**TE**	**PU**	**PE**	**PI**
RA	0.61								
CM	0.53	0.65							
CY	0.50	0.54	0.73						
OC	0.41	0.49	0.62	0.69					
TM	0.43	0.42	0.60	0.51	0.65				
TE	0.46	0.41	0.51	0.46	0.53	0.66			
PU	0.41	0.46	0.53	0.41	0.47	0.52	0.62		
PE	0.45	0.42	0.56	0.45	0.41	0.45	0.41	0.64	
PI	0.49	0.46	0.59	0.52	0.55	0.49	0.49	0.51	0.72

Note: Diagonal elements are the average variance extracted for each of the nine constructs. Off-diagonal elements are the squared correlations between constructs.

4.3. Structural Model and Hypotheses Testing

Following the two-phase SEM technique, the measurement model results were used to test the structural model, including paths representing the proposed associations among research constructs. Further, in order to examine the structural model it is essential to investigate the statistical significance of the standardized regression weights (i.e. t-value) of the research hypotheses (see Table 7); and the coefficient of determination (R^2) for the research endogenous variables as well. The coefficient of determination for perceived usefulness, perceived ease of use, and perceived importance were 0.61, 0.63, and 0.74 respectively, which indicates that the model does account for the variation of the proposed model.

Table 7: Summary of Proposed Results for the Theoretical Model

Research Proposed Paths	Coefficient Value	t-value	p-value	Empirical Evidence
H1: Relative advantage → Perceived usefulness	0.142	1.146	0.001	Supported
H2: Relative advantage → Perceived ease of use	0.171	1.132	0.002	Supported
H3: Compatibility → Perceived usefulness	0.221	1.613	0.004	Supported
H4: Compatibility →Perceived ease of use	0.201	1.854	0.003	Supported
H5: Complexity → Perceived usefulness	0.184	1.779	0.000	Supported
H6: Complexity → Perceived ease of use	0.179	1.149	0.000	Supported
H7: Organizational competency →Perceived usefulness	0.159	1.139	0.027	Supported
H8: Organizational competency →Perceived ease of use	0.171	2.114	0.040	Supported
H9: Top management support → Perceived usefulness	0.214	2.651	0.030	Supported
H10: Top management support →Perceived ease of use	0.234	2.168	0.016	Supported
H11: Training and education → Perceived usefulness	0.131	2.358	0.005	Supported
H12: Training and education → Perceived ease of use	0.129	2.224	0.003	Supported
H13: Perceived ease of use → Perceived usefulness	0.289	3.452	0.000	Supported
H14 Perceived ease of use → Perceived importance	0.312	4.578	0.000	Supported
H15: Perceived usefulness → Perceived importance	0.335	4.782	0.000	Supported

5. Discussion and Conclusion

This research aimed to test several factors impacting cloud computing perceived importance in several Arab firms, exclusively in Jordan, Saudi Arabia and United Arab Emirates. The study used two main statistical tools to analyze the survey data. Regarding the survey analysis methods, a general descriptive analysis was conducted by applying SPSS version 22, to obtain a summary about the respondents' demographic characteristics by using the response means, frequencies, and standard deviations, alongside initial data examination such as reliability tests. Then, the data was analyzed by using the Structural Equation Modeling (SEM) method, with AMOS software version 20, which involves confirmatory factor analysis (CFA) and structural model analysis.

Fifteen hypotheses were all supported and consistent with the findings of Gangwar et al.'s (2015) study. Indeed, relative advantage, compatibility, complexity, organizational

competency, top management support, and training and education impacted cloud computing perceived usefulness as well as perceived ease of use. In addition, perceived ease of use has an impact on perceived usefulness. Thus, hypothesis 1-13 were supported. This is to say that managers and policy makers need to focus on relative advantages and technological resources to enable cloud computing adoption. Also, the study found that cloud computing adoption is not complex, and a firm should make necessary contribution to making cloud computing system compatible with the firm's processes. Further, in line with Alshamaila et al. (2013) findings, top management support is crucial in convincing their workers toward adopting cloud computing services, besides offering them the appropriate trainings on knowing-how the technical and non-technical perceptions of cloud computing implementations. Moreover, as found in Gangwar et al. (2015) study, the current research confirmed that perceived ease of use impacted perceived importance; and perceived usefulness has an impact on perceived importance as well. Therefore, hypothesis 14 and 15 were supported. Therefore, the more understandable and easier to use cloud computing, then the more the cooperation and coordination between business partners. Also, the more usefulness to use cloud computing by managing the firms' operations efficiently and the like, the more facilitates the trade systems between the business partners. Consequently, cloud computing adopters support the formation of networks with other partners along with the sharing of organizational resources.

The research model of this study was examined in the Arabian context. Moreover, the data required for this study was collected from firms in Jordan, Saudi Arabia and United Arab Emirates through a questionnaire distributed to them. Furthermore, the contributions of this study are useful for both academia and practitioners. From the academic perspective, this study aspires to fill the gap of the incomplete causal chains between several technological, organizational, and environmental variables in gaining cloud computing adoption and the role of new methodological approaches that capture the nature of IT investment decisions such in exploiting cloud computing methods. In addition, the current study not only provide a holistic review of the extant literature on cloud computing, but also considers to be the first research of its nature to test the causal chain of technological, organizational, and environmental variables on cloud computing adoption by using integration of Technology Acceptance Model (TAM) model and Technology-Organizational-Environmental (TOE) framework. In addition, from the industry practitioner's perspective, this study is of interest to IT managers and business managers in terms of their real relationships among them and their employees, and to achieve the best practices for managing electronic collaborations in the firms they work for. IT and business senior management also need to recognize the appropriate mechanisms in which they may well transform their IT preferences into operational decision making. Consequently, the expected findings could provide useful and practical guidelines to IT managers and business managers to understand the resources and conditions required to realize the potential values of their IT investments in terms of cloud computing usage. However, results reported in this study were based on three firms each in Jordan, Saudi Arabia and United Arab Emirates, and in turn are applicable exclusively to this context. Thus, this raises inquiries regarding the generalisability to other cultures and different contexts. Consequently, further research is needed with regards to different sectors and industries and in different countries as well in order to show the difference between adopting cloud computing in the Arab world in comparison to the western countries. Also, for the current research, data were gathered from three firms which implemented cloud computing from top, middle-level IT managers, and IT

employees from the operational level as well; then it is worthy to conduct further research to discriminate the adopting of cloud computing from the top-middle-operational level.

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