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ESTIMATING INFLUENCE OF TOE FACTORS ON E-GOVERNMENT USAGE: EVIDENCE OF JORDANIAN COMPANIES

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ABSTRACT

This paper examines the effect of TOE (Technology, Organizational and External) factors on the usage of e-government among Jordanian public listed companies. Results reveal that in Jordan, companies that are categorized as basic adopters of e-government mainly used e-government for seeking information and contracts (procurement) and TOE factors are generally found to have insignificant effect on the usage. On the other hand, TOE factors are found to have significant effect only on advanced adopters of e-government that mainly used e-government for financial and business integration purposes.

Keywords: E-Government Usage; TOE; Ordered Logit Model.

1. INTRODUCTION

The revolution in Information Communication Technologies (ICT) has resulted in changes in many aspects of people's daily lives around the world. This revolution has also changed the way governments around the globe interact with their citizens, businesses, agencies, employees and other stakeholders (Lee, 2010; Rokhman, 2011). Today's networked environment implies that besides having direct contact with governments, businesses and indivduals make use of other sources to get governmental information (Boer, Wijngaert, Pieterson, & Arendsen, 2012). E-government is vital because it helps to optimize service delivery strategy to businesses and citizens. These changes and development have promoted the adoption of electronic government or e-government in many countries (Raus, Liu, & Kipp, 2010; Elsheikh, Cullen, & Hobbs, 2007).

Indeed, E-government development projects have numerous political, social, and economic impacts on society. For instance, the uptake of e-government includes cost reductions for

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both the government and the adopters of e-government services. The general perception is that e-government uptake helps to reduce costs by making operations more efficient, serving citizens better and reducing complex and over-stretched bureaucratic system (Sharifi & Manian, 2010; Basu, 2004). Past studies have also highlighted the potential contribution of e-government to enhance interactivity, transparency, and openness of public sector entities and to promote new forms of accountability (Bonson, Torres & Royo, 2012). Government web sites or e-government sites have evolved from the pure information-sharing phase to interactive, transactional, and intelligent or integration phase. Today, many nations view e-government as an enabler of economic competitiveness and growth. Thus, it is not surprising that many governments have shown interest to allow citizens both from urban and rural regions to use technological tools and information syatems to enable them to interact with the goevernment (Khan, Moon, Swar, Zo & Rho, 2012).

The Jordanian government realized the need to implement e-government in order to take advantage of the opportunities offered by international trade. Jordan would need more efficient, market-oriented custom's regime to comply with World Trade Organization (WTO) requirements, capable of handling increased traffic at the borders while at the same time preventing the entry of pirated software (Tadros & Assem, 2006). As such, the Jordanian government has invested heavily in e-government initiatives for the last 10 years. However, there seems to be a lack of empirical evidence regarding the current stage of e-government adoption and what influences business organizations in Jordan to adopt e-government from the demand-side perspective.

In addition, in the globalization era, understanding the adoption of ICT, including e-government by developing countries is becoming important to improve its adoption success (Shareef, Kumar, Kumar, & Dwived, 2011). Among others, this will enable developed countries to trade with developing countries more efficiently. At this stage, there are only a limited number of studies on the adoption of e-government by developing countries (Shareef et al., 2011).

This paper aims to fill this gap and estimate the factors which influence the e-governement adoption using a sample of Jorndanian public listed companies.

2. LITERATURE REVIEW

E-government is more than simply making information and some citizen services available via a website. E-government runs wide and deep across all aspects of government, deep within the core of every government entity (Curtin, Sommer, & Vis-Sommor, 2013). The emergence and importance of e-government has attracted scholars to explore issues related to levels of e-government maturity and antecedents that drive e-government adoption. As a result, a good number of e-government stage models have been proposed to expain the adoption and diffusion of e-government among businesses and citizens. These models differ from one perspective to another such as technological perspective, organizational perspective and the managerial perspective (Lee, 2010). For example, Layne and Lee's (2001) four-stage model (information dissemination, forms only, end-to-end electronic transaction, and transforming government), and Moon's (2002) and Hiller and Belanger's (2001) five-stage model (information, two-way communication, transaction, integration, and participation) are fairly similar.

Whatever the stage the model is in, essential stages should be included. These stages are publishing, transaction and integration stage. However, the MoICT in Jordan has adopted the four stage model. These four stages are presentation of information, mutual contacts, financial transactions and the integration of services. Thus, the present study uses a four stage e-governement adoption.

In investigating the individual-level adoption and acceptance of new technologies, several models and theories were used in the literature, but more importantly the TRA (Fishbein & Ajzen, 1975) and the TAM by Davis (1989). Even though both TRA and TAM model are considered as useful ground in understanding user's acceptance of new technology across a range of populations, they are not suited for investigation into organizational-level acceptance of technologies (Bwalya, 2009).

Since the decision to adopt e-government among business is generated as a strategic firm-level initiative, therefore, there is a need to employ an organizational-level theory to explain and predict a firm's acceptance behavior of e-government (Al-shafi & Weerakkody, 2009). Several previous studies that investigated e-government adoption employ the DOI theory by Rogers 1983 (e.g. Sang, Lee & Lee, 2009).

DOI describes the process by which an innovation is communicated through certain channels over time between the members of a social society. One common criticism about DOI theory is that it does not take into consideration the environmental factors where the organization conducts business, such as competition, which could work as a barrier or a motivation to technology acceptance and adoption (Chen, Yen & Chen, 2009).

Tornatzky and Fleischer (1990) used a framework similar and consistent with the theory of innovation diffusion in organizations by Rogers (1983) in developing a model to add the environment factor to their framework. It explained a firm's technological innovation decision making behavior, and the environment presents both constraints and opportunities for technological innovation (Tornatzky & Fleischer, 1990). The TOE framework makes Rogers's innovation diffusion theory able to explain firm innovation diffusion (Wang & Ahmed, 2009; Hsu, Kraemer & Dunkle, 2006).

According to the TOE model, there are three areas that an organization uses to determine how to take advantage of the new technology relating to e-government, which can influence the process of adopting, implementing and using technological innovations (Tornatzky & Fleischer, 1990). These are technological factors, organizational factors and environmental factors. The first refers to the existing as well as new technologies relevant to the firm. These factors play a significant role in the firm's adoption decision as it determines the ability of the firm to benefit from e-government initiative. Examples are prior technology usage, and number of computers in the firm.

Organizational factors refer to descriptive measures related to organization structure, financial support, managerial beliefs and top management support. The environmental context focuses on the external factors that drive firms to adopt new technology such as competition and government incentives and regulations.

E-government empirical studies often differ in their findings in the literature. Accordingly, lack of generalizability is frequently cited as one of the limitations in some empirical studies (Horst, Kuttschreuter & Gutteling, 2007; Fu, Farn & Chao, 2006). In Jordan, for example, e-government research is in its early stages (Elsheikh et al., 2007) and the level of ICT change that would be offered to Jordan will be huge. As a result, the country can hardly afford to be left behind in harnessing the benefits of implementing e-government (Mofteh & Wanous, 2008).

There are a number of empirical studies undertaken in different countries to study e-government adoption. For example, Jordan (Ibrahim & Abdullah, 2006); United States (Norris & Moon, 2005); Germany (Schedler & Schmidt, 2004); Britain (Li, 2003), and South Africa (Wong & Welch, 2004). Each study contributes in providing a strong theoretical understanding of the factors explored in the research model. These studies are conceptual, descriptive and exploratory in nature. However, the findings failed to provide relevant facts regarding the current state of e-government across different countries and sectors.

A study conducted by Aboelmaged (2010), investigated the effects of TAM and TPB variables on the intention of e-procurement adoption in the United Arab Emirates (UAE). The factors examined including ease of use, attitude, usefulness, subjective norm, and behavioral control. The findings show that the proposed model has a good explanatory power and confirms its robustness with a reasonably strong empirical support in predicting users' intention to use e-procurement technology.

A study conducted by Ramdani, Kawalek and Lorenzo (2009) used TOE framework to examine the influence of technological factors (relative advantage, compatibility, complexity, trialability, and observability), organizational factors (top management support, organizational readiness, IS experience, organizational size, and industry sector), and environmental factors (competitive pressure, external IS support, and market scope) to examines the adoption of enterprise systems (ERP, CRM, SCM and e-procurement) among Small and Medium Enterprises (SMEs) located in the Northwest of England. Several factors were found to be significant in influencing enterprise system's adoption in SMEs' such as, relative advantage, trialability, top management support, organizational readiness and size. Surprisingly, environmental factors were found to be insignificant.

A study conducted by Lippert and Govindarajulu (2006) examined TOE antecedents to web service's adoption, which indicated important variables of technological factors (security concerns; reliability; deployability), organizational factors (firm size; firm scope; technological knowledge; perceived benefits) and environmental factors (competitive pressure; regulatory influence; dependent partner readiness; trust in the web service provider).

Another study was conducted by Thong (1999) using TOE framework to examine CEO characteristics' (CEO's innovativeness and IS knowledge), technological factors' (relative advantage, compatibility, and complexity), organizational factors' (business size, employees' IS knowledge) and environmental factors' (competitive pressure) influence on business innovation adoption. The findings showed that small businesses with certain CEO characteristics (top management and level of IS knowledge), technological factors (relative

advantage, compatibility, and complexity of IS), and organizational factors (business size and level of employees' IS knowledge) are more likely to adopt IS.

While CEO and innovation characteristics are important determinants of the decision to adopt, they do not affect the extent of IS adoption. The extent of IS adoption is mainly determined by organizational factors. Finally, the environmental factor of competition pressure has no direct effect on small business adoption of IS.

However, Thong's (1999) study did not include other variables that may be potential determinants of e-government adoption in businesses, including other factors of innovation such as security, IT infrastructure, government pressure, business nature, organization culture, top management support, and financial recourse.

In case of innovation adoption among business organizations, factors such as IT infrastructure and government pressure are very important in impacting the adoption decision which was not included in Thong's (1999) study. Hence, there is a need to investigate such factors in another context such as e-government adoption.

Limited studies were conducted to investigate e-government in Jordan or the rest of the Arab world. One of these studies was conducted by Mofteh and Wanous (2008) who examined factors influencing citizens' adoption of e-government services. It was found that variables such as trust of the internet and government, compatibility, awareness, and previous experience are determinants of citizen's adoption of e-government. The study identified variables that will increase citizens' demand for e-government services. The study also highlighted the different need of Jordanian society's e-government products, and services based on population segments. However, that study only focused on success factors in implementing e-government in Jordan among citizens, and business's adoption of e-government.

Using TOE framework, Alawneh and Hattab (2009), examined the influence of technological factors (technology readiness), organizational factors (firm size, financial resources, IT strategy, online revenues, IT professionals), and environmental factors (competition intensity, regulatory support environment) on the value of e-business adoption using a survey sample of 140 employees from seven banks. Several key factors were found to have significant influence in e-business adoption in banks namely technology readiness, financial resources, IT strategy, competition intensity, and regulatory support environment.

In their study, they discussed an interesting, but not entirely adopted and applied topic; value creation in e-business. According to Alawneh and Hattab (2009), empirical studies on e-business or e-government ventures and application's adoptions among business organizations are rare in Jordan. The authors stated that: "As far as we know, this study is one of the first in Jordan that has attempted to evaluate the value of adopting e-business in banking services industry."

The statement has provided evidence that research in e-government adoption among business in Jordan is limited. In particular, there is a lack of academic research focusing on performance and status of e-government adoption among businesses in Jordan.

To conclude, the literature highlights the need for more studies to be conducted especially in the developing countries in order to investigate the citizens' and business adoption of e-government. In addition, the literature review indicates that there is a lack of empirical evidence on the factors that influence business firms to adopt e-government and the impact on firm performance. Hence, to fill the gap, this study focuses on e-government adoption among businesses in Jordan.

3. DATA AND METHODOLOGY

3.1. Data

The target population of this study consists of all Jordanian firms that are registered in the Amman Stock Exchange (ASE) numbering 260 firms on 2010. It comprises 133 firms from industry sectors, 28 firms from insurance sector, 81 firms from service sector, and 18 firms from banking sector. In this study, the samples include all the population, which means the sample size, is the same as the population size. This approach is adopted because of the small population size of 260 firms, which are listed in ASE.

The data are collected with mail questionnaires (with follow-up calls). A questionnaire was developed to collect data from the respondents to provide answers to the research questions. However, as stringent regulations prohibit Jordanian firm's employees to respond to any questionnaire except with the consent of the top management, a formal request letter was sent to seek permission from them. Permission was obtained from these firms, and the questionnaires were sent to the public relations office at the head office of firms listed in ASE, which subsequently redirected them to the respective managers. Despite these efforts, a total of 113 useable questionnaires are obtained. This represents a response rate of 43.46%.

To ensure that the respondents have no problem with answering the questions, a pilot study (35 questionnaires) is conducted on August and September 2010. The measurement of e-government adoption and TOE factors are as presented in Appendix I.

3.2. Methodology

The ordered logit model estimated take into account the ordinality of different e-government adoption levels. A latent model framework is used to derive the empirical model. For each stage of e-government adoption (information, mutual, financial and integration), given the company's utility function as below:

$$U_{ij} = \beta' z_i + \varepsilon_{ij} \qquad \ldots(1)$$

where

U = Utility of making choice on the e-government usage level of j (j=1,2,3,4,5)
z = vector of independent variables (TOE factors and other control variables)
ε = error term
i = 1,2,…,113 (sample size)
j = 1,2,3,4,5 (choices on the level of adoption)

The companies are assumed to maximize utility while making their choice on *j*. The model assumes that the reported usage of e-governement adoption (y) is related to the U (which is unobservable) and also the four boundary parameters, μ and $\mu_1 < \mu_2 < \mu_3 < \mu_4$. Assuming that the error term in the latent equation (1) is logistically distributed, the probability that the company reports the e-governement usage level is given as below:

$$P_{ij} = \Pr(y = j \mid x) = \Lambda(\mu_j - x\beta) - \Lambda(\mu_{j-1} - x\beta)$$
$$\text{where } j = 1 \text{ to } 5 \;\&\; \mu_0 = -\infty \;\&\; \mu_5 = \infty$$

The Λ is the cumulative logistic distribution function. The maximum likelihood parameter estimates (MLE) are obtained by maximize the log likelihood function with respect to β and μ,

$$LF(\beta, \mu) = \sum_{i=1}^{n} \sum_{j=1}^{J} Z_{ij} \ln (P_{ij}) \qquad \ldots(2)$$

The z_{ij} is an indicator variable equal to unity if graduate *i* rank the importance of *j* and zero otherwise. The model is estimated with the robust variance estimates (Huber/White/sandwich estimator of variance).

Factor analysis is performed to obtain the factors scores which represent the TOE factors (see Appendix II).

4. RESULTS

4.1. Descriptive statistics

Table 1 presents the descriptive statistics on the e-government adoption. It is found that the mean level of e-government adoptions varies across different stages of adoption. Information, being the lowest stage of e-government adoption, has the highest mean of adoption (a mean value of 3.9115 from a 5-point rating scale). Majority of respondents agreed that they are using on this e-government (information). On the other hand, Integration, being the highest stage of e-government adoption, has the lowest mean of adoption (1.9735). It is only less than 6% of the respondents are using on this e-government (integration).

This finding shows that after more than a decade of implementation of e-government adoption, the companies are indeed successfully adjusted to the low level of e-government of adoption. However, more efforts are needed to increase the high level e-government adoption such as Integration and Financial. Hence, studies on e-government should focus on high level of e-government adoption.

Table 1: Usage of e-government adoption and TOE

	Information		Mutual		Financial		Integration	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
1 (strongly disagree)	1	0.88	1	0.88	34	30.09	37	32.74
2	2	1.77	1	0.88	46	40.71	48	42.48
3	28	24.78	59	52.21	27	23.89	22	19.47
4	57	50.44	40	35.40	5	4.42	6	5.31
5 (strongly agree)	25	22.12	12	10.62	1	0.88	0	0.00
	Mean	**SD.**	**Mean**	**SD**	**Mean**	**SD.**	**Mean**	**SD.**
Descriptive statistics	3.9115	0.7856	3.5398	0.7324	2.0531	0.8948	1.9735	0.8604

To examine the relationship of TOE factors (Technology factors: IT infrastruktur, relative advantage, comparative advantage, security; Organizational factors: Vision, culture, top management, human and financial resources; External factors: government support and competition) with the e-government adoption (four stages: Information, Mutual, Financial and Integration), cross-tabulation tables are constructed. Table 2a-d present the results of these cross-tabulations. The values of Table 2a-d represent the mean of factor scores on the TOE (see Appendix 3). Thus, these values can only be interpreted in relative to others.

Table 2a: TOE factors and e-government adoption (Information)

TOE (Mean)	**Information**				
	1 (strongly disagree)	**2**	**3**	**4**	**5 (strongly agree)**
Technology factors:					
IT infrastruture	-1.54	0.33	-0.07	-0.01	0.13
Relative Advantage	1.00	-0.49	-0.09	0.01	0.07
Comparatibility	-1.15	-0.86	-0.11	0.04	0.14
Security	1.68	-1.36	-0.28	0.08	0.16
Organizational factors:					
Culture_Vision	-1.07	-0.04	0.13	-0.04	0.00
Culture_Others	-0.60	0.52	-0.02	0.09	-0.21
Top Mgt Support	0.99	0.37	-0.19	0.05	0.04
Financial resources	0.19	-0.31	-0.12	-0.07	**0.32**
Human resources	0.17	-1.29	-0.01	0.17	-0.28
External factors:					
Gov Support	0.25	0.95	-0.16	0.03	0.03
Competition pressure	-0.22	0.29	-0.35	0.10	0.16

Table 2b: TOE factors and e-government adoption (Mutual)

TOE (Mean)	Mutual				
	1 (strongly disagree)	2	3	4	5 (strongly agree)
Technology factors:					
IT infrastruture	-1.04	0.41	-0.02	-0.01	0.16
Relative Advantage	0.78	-0.49	-0.03	0.10	-0.19
Comparatibility	-0.66	1.20	-0.03	0.01	0.07
Security	-0.20	0.11	0.04	-0.12	0.21
Organizational factors:					
Culture_Vision	0.21	-1.17	-0.04	0.05	0.11
Culture_Others	-1.23	-1.22	0.02	0.12	-0.28
Top Mgt Support	0.65	-0.62	-0.05	-0.01	0.30
Financial resources	0.97	0.11	-0.04	0.14	-0.38
Human resources	-0.93	-1.28	0.11	-0.15	0.16
External factors:					
Gov Support	0.55	-0.11	-0.05	0.01	0.15
Competition pressure	0.53	0.23	-0.05	-0.04	**0.33**

Table 2c: TOE factors and e-government adoption (Financial)

TOE (Mean)	Financial				
	1 (strongly disagree)	2	3	4	5 (strongly agree)
Technology factors:					
IT infrastruture	-0.09	0.07	-0.02	0.25	-0.58
Relative Advantage	0.39	-0.15	-0.08	-0.80	-0.11
Comparatibility	-0.02	0.02	-0.05	-0.10	1.76
Security	-0.10	0.01	0.03	0.37	-0.07
Organizational factors:					
Culture_Vision	-0.27	-0.02	0.31	0.12	0.99
Culture_Others	-0.89	0.02	0.67	1.81	**2.43**
Top Mgt Support	-0.31	0.03	0.38	-0.10	-0.62
Financial resources	0.11	-0.07	0.03	-0.29	-0.15
Human resources	0.03	0.04	0.00	-0.37	-0.80
External factors:					
Gov Support	-0.01	-0.16	0.17	0.60	0.38
Competition pressure	0.25	-0.17	0.05	-0.52	1.02

Table 2d: TOE factors and e-government adoption (Integration)

TOE (Mean)	Integration				
	1 (strongly disagree)	2	3	4	5 (strongly agree)
Technology factors:					
IT infrastruture	0.23	-0.05	-0.22	-0.21	-
Relative Advantage	0.04	0.03	-0.05	-0.31	-
Comparatibility	0.14	0.04	-0.23	-0.31	-
Security	-0.16	0.04	0.13	0.23	-
Organizational factors:					
Culture_Vision	-0.85	-0.04	1.04	**1.75**	-
Culture_Others	-0.21	0.10	0.11	0.10	-
Top Mgt Support	-0.07	0.09	0.00	-0.27	-
Financial resources	0.01	0.15	-0.11	-0.90	-
Human resources	0.14	-0.19	0.04	0.52	-
External factors:					
Gov Support	0.16	-0.12	-0.08	0.26	-
Competition pressure	0.05	0.01	-0.19	0.33	-

From Table 2a, it is clearly indicates that the TOE factor of financial resources has the highest scores (relatively) among the companies have high e-government adoption on information. For other stages of e-government adoption, TOE factors that have the highest scores are external competition (mutual), organizational culture (financial), and organizational vision (integration). This result implies that for usage of high stage of e-government, the culture and vision of organizational play important roles. On the other hand, for low stage of e-government, financial resources and external competition will influences its usage

In terms of company characteristics, from Table 3, it is found that for low level of e-government usage (information and mutual), companies with higher level of sale have higher usage. However, for high level of e-government usage (integration), companies with middle level of sale have the highest usage. Relating to the economic sector, it is found that industry and insurance sectors have higher usage of e-government. Overall, the usage of low level of e-government is higher than the usage of high level of e-government.

In terms of the CEO/Top management characteristics, from Table 4, it is found that by gender, female CEO/Top management has higher usage of e-government (regardless the stages) than male. By age, it appears that CEO/top management in age group of 30-39 years old is having lower level of e-government usage, compared to age group of 40-49 and above 50 years. CEO/top management with postgraduate degree has higher e-government usage of financial and integration; whereas diploma and degree CEO/top management has higher e-government usage on information and mutual.

Table 3: Usage of e-government and characteristics of firms

Characteristics of firms	Freq	%	Mean			
			Information	Mutual	Financial	Integration
Sales						
less than jd1 million	32	28.32	3.75	3.47	1.91	2.13
jd1 million to 10 million	27	23.89	3.78	3.56	2.19	2.00
more than jd10 million	54	47.79	4.07	3.57	2.07	1.87
Sector						
industry sector	50	44.25	3.98	3.76	2.10	2.02
insurance sector	18	15.93	4.00	3.44	2.11	2.11
services sector	30	26.55	3.63	3.37	1.83	1.80
banking sector	15	13.27	3.90	3.53	2.05	1.94

Table 4: Usage of e-government and characteristics CEO/Top Management

Characteristics of CEO/ Top Mgt	Freq	%	Mean			
			Information	Mutual	Financial	Integration
gender						
male	104	92.04	3.90	3.53	2.05	1.94
female	9	7.96	4.00	3.67	2.11	2.33
age						
30-39	31	27.43	3.90	3.35	1.87	1.81
40-49	56	49.56	3.88	3.64	2.13	2.04
above 50	26	23.01	4.00	3.54	2.12	2.04
Education						
Diploma	3	2.65	4.33	3.67	1.67	1.67
First degree	75	66.37	3.92	3.68	2.09	1.99
MBA	27	23.89	3.89	3.19	2.00	2.15
PhD	8	7.08	3.75	3.38	2.00	1.38

In short, results of descriptive statistics reveal that the low stages of e-government adoption (information and mutual) are widely used by the Jordanian companies. However, high level of e-government adoption (integration and financial) is still lowly adopted. TOE factors of organizational culture and vision positively related to the high level of e-government adoption; whereas, TOE factors of financial resources and competition are related to low level of e-government adoption.

4.2. Ordered Logit Model

The ordered logit models are estimated for the four stage of e-government adoption: information, mutual, financial and integration. Two models are estimated: basic model which

is without control variables on estimating the effects of TOE factors on e-government adoption and extended model which is with control variables.

4.2.1. Basic Models

Table 5 presents the estimated ordered logit model (basic –without control variables). The results of goodness of fits tests are presented in Table 5 as well. It is found that the estimated models are fit for high level of e-governement adoption (financial transaction and integration services). This finding suggests that the TOE factors have their explanatory power only on high level of e-government adoptions.

Table 5: The estimated ordered logit model (Basic)

	Presentation of information		**Mutual contracts**		**Financial transaction**		**Integration services**	
	OR	**P-value**	**OR**	**P-value**	**OR**	**P-value**	**OR**	**P-value**
Technology factors:								
IT infrastruture	1.1610	0.3520	1.0925	0.6400	1.2551	0.4900	**0.4328**	**0.0010**
Relative Advantage	1.1337	0.4740	0.9992	0.9960	**0.3394**	**0.0030**	0.8743	0.6540
Compactibility	1.3068	0.1610	1.0294	0.8880	1.1679	0.4690	**0.3370**	**0.0000**
Security	1.4340	0.1100	0.9814	0.9100	**1.5691**	**0.0720**	**1.6445**	**0.0740**
Organizational factors:								
Culture_Vision	0.9508	0.7780	1.1337	0.4470	**2.6923**	**0.0000**	**88.005**	**0.0000**
Culture_Others	0.8849	0.4850	1.0329	0.8610	**23.543**	**0.0000**	**1.8127**	**0.0970**
Top Mgt Support	1.0960	0.5610	1.1391	0.4350	**1.8912**	**0.0040**	0.9314	0.8360
Financial resources	1.3258	0.1240	0.9428	0.7360	0.7821	0.2760	**0.3926**	**0.0070**
Human resources	0.9455	0.7830	0.9408	0.7670	0.7159	0.1590	0.8475	0.5900
External factors:								
Gov Support	1.0680	0.7440	1.0927	0.6310	**1.4860**	**0.0460**	0.5569	0.3000
Competition pressure	**1.3922**	**0.0980**	1.1295	0.4880	**0.6545**	**0.0530**	**0.5716**	**0.0550**
Goodness of fit tests								
Pseudo R2	0.0519		0.0094		0.5083		0.5837	
Overall fit test (p-value)	0.1143		0.9961		0.0000		0.0000	
General specification test (p-value)	0.5941		0.7590		0.3349		0.8822	
Percentage correctly predicted (%)	52.21		50.44		83.19		80.53	

From Table 5, it is found that the TOE factors (technology, organizational and external) that influence the usage of e-government are varied across the different stage of e-government adoption (information, downloading, financial transaction and integration services).

At low level of e-government adoption (information and downloading), the TOE factors (have little effects on the usage. This may due to low variances as the sample statistics reveal that

more than 90% of the firms have used these two stages of e-government. However, at high level of e-government adoption (financial transaction and integration), the technology, organization and external factors are found to have significant influences on the e-government usage.

Individually, among the technology factors, security is the only one that has positive and significant impact on the usage of e-government for financial transaction and integration services. Thus, increase of security in e-government will lead to increase in high level e-government usage.

Among the organizational factors, culture of an organization is found to have a positive and significant impact on high level e-government usage. In particular, organization culture relating to vision has a large impact on the use of e-government for integration services. On the other hand, organization culture of others has large impact on the use of e-government for financial transactions. Top management support is also needed to increase the usage of e-government for financial transaction. Among the external factors, it is found that external support from government is important to increase the usage of e-government for financial transaction.

4.2.2. Extended Models

Table 6 presents the estimated ordered logit models which control the effects of characteristics of firms and CEO/top management. It is found that the results are almost similar to the previous (except the external factor of government support turns into insignificant). Thus, the estimated results of Table 5 are robust, i.e., whether control or not on the influences of firms and CEO/top management's characteristics.

Table 6: The estimated ordered logit model (Extended)

	Presentation of information		**Mutual contracts**		**Financial transaction**		**Integration services**	
	OR	**P-value**	**OR**	**P-value**	**OR**	**P-value**	**OR**	**P-value**
Technology factors								
IT infrastruture	1.2773	0.2390	1.0015	0.9940	1.1496	0.6990	**0.3017**	**0.0010**
Relative Advantage	0.9452	0.7740	1.0292	0.8770	**0.3238**	**0.0020**	**0.4921**	**0.0350**
Compactibility	1.4058	0.1520	0.9661	0.8870	1.0395	0.8980	**0.1194**	**0.0010**
Security	1.4332	0.1780	0.9826	0.9200	**1.8463**	**0.0320**	**1.9754**	**0.0590**
Organizational factors								
Culture_Vision	0.8570	0.4790	0.9736	0.8720	**2.6478**	**0.0010**	**4661**	**0.0000**
Culture_Others	**0.5864**	**0.0200**	1.2696	0.3630	**46.2131**	**0.0000**	2.0059	0.1720
Top Mgt Support	1.3484	0.1270	1.0031	0.9860	**1.8565**	**0.0100**	1.3960	0.4620
Financial resources	1.2601	0.2410	1.0254	0.8920	0.7514	0.2710	**0.1890**	**0.0060**
Human resources	0.8478	0.4790	0.8267	0.3820	**0.6281**	**0.0930**	0.7156	0.3350
External factors								
Gov Support	1.0117	0.9590	1.0114	0.9590	1.3341	0.2020	0.5648	0.2460
Competition pressure	1.4164	0.1510	0.9726	0.9100	0.6163	0.1550	0.5709	0.1540

Table 6: The estimated ordered logit model (Extended) *cont*

	Presentation of information		Mutual contracts		Financial transaction		Integration services	
	OR	**P-value**	**OR**	**P-value**	**OR**	**P-value**	**OR**	**P-value**
Control variables								
Sales	0.7142	0.3930	0.6964	0.3780	0.8911	0.8270	**0.0354**	**0.0010**
Number of Employee	1.0138	0.1520	1.0030	0.5810	0.9861	0.1000	0.9945	0.6360
Use of internet[1]	0.7822	0.6040	**0.4304**	**0.0900**	2.3815	0.1490	**5.5232**	**0.0340**
Use of e-gov[2]	0.8537	0.6780	**2.3184**	**0.0310**	1.2764	0.6280	0.7920	0.7060
Dinsurance[3]	0.8449	0.8500	0.4018	0.2820	2.0411	0.4630	**33.454**	**0.0630**
Dservices[3]	0.4798	0.3080	0.2703	0.1170	0.2143	0.1600	0.1602	0.2290
Dbanking[3]	2.2374	0.3940	**0.1258**	**0.0680**	0.6644	0.7160	**27237**	**0.0000**
DMale	0.9179	0.9100	0.4020	0.1600	0.8560	0.9260	0.5258	0.5520
Age	1.3053	0.3390	1.1536	0.6140	1.2047	0.7190	0.9719	0.9520
Education[4]	0.7839	0.5010	0.6466	0.2800	1.1661	0.7530	0.2758	0.1010
Access[5]	0.9871	0.9610	1.1550	0.6630	0.9021	0.6810	0.6069	0.1970

Notes:

1. "Use of internet" refers to how the company describes its use of internet ranging from industry leader, close follower, middle of the pact, somewhat behind to lagging.
2. "Use of e-government" refers to how the company describes its use of e-government ranging from industry leader, close follower, middle of the pact, somewhat behind to lagging.
3. Comparison group is industry sector.
4. "Education" refers to the highest level of education (CEO/top management who responses to this survey), ranging from diploma or below, bachelor degree, master degree to PhD.
5. "Access" refers to the daily access of internet (CEO/top management who responses to this survey), ranging from never, about an hours a day, 1-2 hours a day, 2-3 hours a day, to more than 3 hours a day.

5. CONCLUSIONS

Changing the relationship between citizens and government, businesses and government are often cited as goals for e-government adoption and implementation. Networks such as e-government have the potential to improve interactions between government and businesses (Mossberger, Wu & Crawford, 2013). The low level of e-government adoption interms of the applications being used, after having implemented for more than one decade in Jordan, is reflected by the Jordanian companies that mainly used e-government to seek information and contracts from Jordanian Government. The TOE factors are found to have insignificant influence on these basic adopters. However, there are a small number of Jordanian comapnies that are advanced adoptors of e-government that used it for financial transactions and business integration. TOE factors are found to have significant impact on these advanced adopters. This finding implies that future studies on e-government adoption should be conducted at disaggregates level and the focus should be on the high level usage (advanced adopters). Blanket approach to examine e-government adoption without taking into consideration on the stage/level of adoption should be avoided.

In terms of policy implication, the Jordanian government should be aware that low level of e-government usage among Jordanian businesses. Policies should be devised to transform these basic adopters of e-government to advanced adopters. In other words, adoption of advanced e-government applications such as for financial and business integration among companies in Jordan needs to be enhanced. The technology, organizational and external factors appeared to have influenced only advanced adopters of e-government. The relative advantage of e-government, IT infrastureture, compactibility, security, organization culture and vision of organization support e-governemnt adoption. External support to companies from Jordanian government, and competittors' pressure, are the TOE factors which could be manipulated to drive Joedanian companies to be advanced e-government adopters.

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APPENDICES

Appendix I: Measurement of E-Governement Adoption and Toe Factors

E-governemt adoption	Operationalization	Number of Items	Measurement scale	Items Source
E-government Adoption	The firm's uptake and use of the various available functions and services provided by the Jordanian e-government which range from getting information (information), Locating governmental agencies, downloading forms and applications, Filling out forms and submitting information online through governmental web sites (mutual), to conducting transactions with government online (integration).	4	5-point rating scale from 1 being strongly disagree to 5 being strongly agree	Zhao, Truell and Alexander, 2008

TOE	Operationalization	Number of Items	Measurement scale	Items Source
Relative Advantage	The degree to which an innovation is perceived as being better than the idea it supersedes.	4	5-point rating scale from 1 being strongly disagree to 5 being strongly agree	Moore and Benbasat, 1991
Compatibility	The degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.	4	As above	Premkumar and Roberts (1999)
IT Infrastructure	Hardware and software that enable users to do secure internet related business.	5	As above	Ramamurthy and Premkumar (1999)
Security	Perception and fear of safeguarding mechanisms for the movement and storage of information through electronic databases and transmission media.	3	As above	Jones and Beatty, 1998; Fulford and Doherty, 2003
Organizational Culture	Second order construct that consisted of four traits. These are adaptability, mission, involvement and consistency.	8	As above	Denison and Mishra, 1995
Top Management Support	The extent of commitment and resource support from organization's top management for e-government adoption.	4	As above	Sutanonpaiboon and Pearson, 2006

APPENDICES

Appendix I: Measurement of E-Governement Adoption and Toe Factors *(cont)*

TOE	Operationalization	Number of Items	Measurement scale	Items Source
Resource	Allocation and spending of the amount of money required to support activities and obtain the necessary human and other resources such as hardware and software licenses.	6	As above	Sutanonpaiboon and Pearson, 2006
Competitive Pressure	Pressure derived from the advantages that competitors enjoy when they adoption new technology, in which a firm has to consider whether or not to follow its competitors, or threat of losing competitive advantage, forcing firms to adopt e-government.	5	As above	Sutanonpaiboon and Pearson, 2006
Government Support	The government support and promotion of e-government adoption among business.	5	As above	Sutanonpaiboon and Pearson, 2006

APPENDICES

Appendix II: Factor Analysis on Toe Factors

Procedure :

Factor analysis is conducted to determine the dimensions of the three major concepts namely TOE factors, using the following steps:

1- Consideration of the appropriateness of the data for the factor analysis by fulfilling the required assumptions such as adequate sample size, existence of adequate correlations between the variables in the same factor, achieving linearity condition and checking for outliers.

2- Factor extraction using suitable techniques to verify the smallest number of factors. In this study the principle component analysis (PCA) was adopted since this technique was widely used by researchers. In PCA, the main variables were grouped into smaller linear variables and analyzed all the shared variance by using a mathematical model (Tabachnick & Fidell 2007). Tabachnick & Fidell (2007) considered this approach as the best choice in the case of looking for an experimental review of the variables. For these reasons, PCA was adopted for this study.

3- Factor rotation and explanation is the last step in factor analysis conducted. In specific cases, there is a need to repeat the rotation. When there appears to have high loadings in more than one factor. Factor scores are saved to represent the variables.

4- After the factor analysis, reliability test was undertaken to assess the goodness of the measurement. Specifically, reliability analysis is to determine the internal consistency of the measurement items after factor analysis. The most widely measurement for the reliability of the scale is Cronbach's alpha value that ranged from 0 to 1. According to Hair, Money, Page and Samouel (2007) a value of 0.7 is an acceptable alpha value for research in general.

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APPENDICES

Technological Factors :

KMO and BTS for Technological Factors

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.799
Bartlett's Test of Sphericity	Approx. Chi-Square	1146.297
	df	120
	Sig.	.000

Loadings on Final Four Factors Using Varimax Rotation

Rotated Component Matrix[a]

	Component			
	1	2	3	4
TITI3	.851			
TITI5	.846			
TITI2	.829			
TITI4	.816			
TITI1	.537			
TRA2		.880		
TRA1		.873		
TRA3		.859		
TRA4		.848		
TC2			.891	
TC1			.882	
TC3			.882	
TC4			.802	
TS3				.865
TS2				.861
TS1				.857

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

APPENDICES

Organizational Factors :

KMO and BTS for Organizational Variables

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.678
Bartlett's Test of Sphericity	Approx. Chi-Square	1498.739
	df	153
	Sig.	.000

Loadings on Final Five Factors Using Varimax Rotation

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
OOC3	.898				
OOC4	.869				
OOC5	.864				
OOC2	.808				
OOC6		.928			
OOC7		.850			
OOC8		.839			
OOC1		.759			
OTMS4			.940		
OTMS1			.937		
OTMS2			.729		
OTMS3			.589		
OR6				.923	
OR1				.895	
OR2				.852	
OR4					.870
OR3					.795
OR5					.759

Notes : Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

APPENDICES

External Factors :

KMO and BTS for External Variables

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.749
Bartlett's Test of Sphericity	Approx. Chi-Square	497.706
	df	45
	Sig.	.000

Loadings on Final Two Factors Using Varimax Rotation

Rotated Component Matrix[a]

	Component	
	1	2
EGS5	.871	
EGS1	.870	
EGS2	.740	
EGS3	.728	
EGS4	.723	
EC3		.818
EC2		.793
EC4		.781
EC1		.714
EC5		.614

Notes: Extraction Method: Principal Component Analysis.