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E-Government Adoption in Jordan: The Influence of Age

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***Abstract*. The use of Internet and new technologies are driving governments to adopt the concept of e-government and work hard to attract all categories of citizens to use their online services. This study will explore the influence of age as a predictor of technology acceptance utilizing the original technology acceptance model constructs (perceived ease of use and perceived usefulness) and their influence on intention to use the technology. Results indicated a significant prediction of intention to use e-government services by age, perceived ease of use, and perceived usefulness. This paper supported the original technology acceptance model, and the role of age as a predictor of technology adoption. Age was negatively associated with of intention to use. Conclusions and future work are depicted at the end.**

Keywords: E-government, technology acceptance model, perceived ease of use, perceived usefulness, intention to use, age, Jordan

I. INTRODUCTION

Information and communication technology (ICT) and the Internet are the driving force behind many new e-applications adopted by businesses and governments in this era. Governments around the world try to enhance their performance in order to increase citizen's satisfaction, and achieve their objectives successfully. Governments achieve their objectives and strategies through the use of several channels to deal with citizens to provide better services, reduces cost and efforts, make citizens more convenient, and empower them to effectively participate in the democratic process.

To benefit from the e-government concept, governments should guarantee equal citizens' access and knowledge of new technology. Such concept is called the digital divide. It is important to offer similar services, and provide equal opportunities to all categories of people in a country. Access and knowledge divides are major determinants that support the success of all e-government dimensions, such as e-democracy, e-voting and e-participation.

The main research objective for this paper is to explore the influence of age on the intention to use e-government services utilizing the technology acceptance model. The following section will review the literature, followed by a description of the research method followed. The next section will describe data analysis and discussion, followed by conclusions and future research.

II. LITERATURE REVIEW

The main research question of this paper is *"Would age significantly influence Jordanians intentions to use e-government services in the context of the TAM?* Based on that, this paper will explore the concept of e-government, the influence of age and the technology acceptance model (TAM).

E-Government.

Governments around the world strive to reach their citizens to provide the needed services and empower them to participate in the democratic process. The e-government project in Jordan was launched in 2001 to transform Jordan into a knowledge society, and in order to contribute in the social and economic development [1]

Literature in this area doesn't provide a standard definition for e-government, where each definition concentrates on certain aspects of E-Government dimension. The basic notion of e-government revolves around using ICT tools and the Internet to provide better services to citizens. Also, some researchers stated that E-Government is not just a web site but it might be a powerful tool for empowering citizens and enhancing their life [2]

Abu-Shanab, p. 16 [3] defines e-governments as "the use of ICT, the Internet, wireless, and mobile networks, and web 2.0 tools and social networks to be able to perform the following: first, setup public polices, and apply them in decent, transparent, and in a high degree of accountability; second, provide a better services to citizens through all electronic means available; third, improve government's performance and efficiency through the necessary change and reengineering efforts; and fourth , reach out for citizens to fully participate in the political and social reform in an effective participatory, consultative and empowerment process. Such process is for the purpose of reaching good connected governance and society development".

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E-Government main purpose is to construct a digital environment to provide citizens with electronic services and information they need through ICT tools. For the success of e-government in a country, governments should motivate citizens to use and utilize e-government services. In addition, there is a critical need to increase citizens' awareness about the benefits of using online services available on e-government websites [4].

Several studies addressed the benefits associated with the establishment of e-government projects. Foley and Alfonso [5, 21] stated that the most important benefit of e-government is the greater efficiency through saving money, minimizing labor cost, and providing better benefits for employees and various types of stakeholders. Citizens are considered an important part in e-government, where e-government contribute into reducing travel cost and time, reducing and saving citizen's time through the quick response, improved, more reliable, and up to date information, improving citizens service, providing convenience through the availability of multiple access channels, and improving citizen's service.

Research reported also several challenges and difficulties facing the adoption of e-government such as managerial and socio-economic factors, the digital divide, legislative issues, public governance issues, institutional complexity, trust in government and technology, and Psychological factors [4, 6, 7].

Even though more than 90 services are offered electronically to citizens and businesses on the website, still many Jordanian citizens are unaware of the full e-government services available and how to use them. Current Jordan e-government services include some of the following: allowing people in Jordan to obtain security clearances, background check certificates, renew commercial and professional certification at the Ministry of Industry and Trade, renew business licenses', and inquire about traffic tickets [8].

The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is an information systems theory developed by Davis [9] and adapted from the Theory of Reasoned Action(TRA). It is considered one of the most important and popular models to anticipate end users acceptance and use of new technology. The TAM provides the basis for predicting the level of use of new technology, where external factors influence internal attitudes, intentions, and beliefs, and thus influence use. In its original version, TAM included five elements; perceived usefulness (PU), perceived ease of use (PEOU), attitudes (AT), intentions to use (ITU), and actual use (U). In the area of e-government, and for the Jordanian context also, research utilized more the influence of PU and OEOU on ITU [10, 11].

TAM determinants (PU, PEOU & ITU) are defined by Davis [9] and refer to technology in general. We propose the following definitions for the purpose of adapting the constructs to the construct of e-government:

Perceived Ease of Use: PEOU is *the extent to which citizens believe that using e-government website is not complicated, and allow citizens to get the information and services they need effortlessly'.*

Perceived Usefulness: PU is *the extent to which citizens believe that using e-government website would be useful for their transactions, saves their time, and enhances their life.*

Intention to Use e-government website: *The extent to which citizens are willing to use e-government website and utilize services provided through it.*

Age as a determinant of e-government adoption

Age is an important demographic variable that has a significant impact on behavioral intention and acceptance of technology [12].Age was explored in the context of using and adopting online services provided by e-government [13, 14, 15].The fast introduction and evolution of new technologies are expected to lead to a differential level of adoption and use of such technology. It is expected that older citizens will have less skill and motivation to acquire and use of new technology [16]. Younger citizens are more likely to visit e-government websites and utilize its services than senior citizens [17].

The growing interest in e-government puts a heavy responsibility on government agencies to attract citizens of all age categories into adopting and using online services provided on e-government website. Warkentin et al. [15] proclaimed that citizens must have the intention to use e-government website and utilize the services provided for them in order to consider e-government initiatives as successful. Similarly, Sharma, Shakya and Kharel [18] stated that people's acceptance of e-government is a key driver of e-government success. They asserted that citizens, of all categories, should use e-government websites for a long period of time where they find it easy to use and provide them with the substantial benefits.

Based on previous research, Renaud and Van Biljon [19] proposed a senior technology acceptance model (STAM), which included several components such as: user context, experimentation and exploration, perceived usefulness, ease of learning and use, intention to use, confirmed usefulness, and actual use. According to their conclusions, the acceptance or rejection of a technology is determined by the ease of learning and use of such technology. STAM is a useful model, where it is provides an explanation of why many senior people do not fully accept new technology.

According to Bavarsad and Mennatyan [11] findings, the greater the ability of a government website to provide online

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services the more citizen's use those services. Moreover, public agencies and governments should encourage citizens to use and accept online services through upgrading e-service provision, make big efforts to train and enhance citizens' awareness of such service so that all categories of users feel secure and easy to access and use e-services.

Porter and Donthu [13] concluded that seniors, and low income and less educated citizens have low e-government use and access than younger, high income and more educated citizens. This is attributed to citizens' individual believes toward Internet in general, and the effect of perceived ease of use and perceived usefulness of technology.

As summary age is one of demographic factors that affect the intention of citizens to use e-government websites. The United Nations e-government reports indicated that major Internet users are citizens of age less than 35 years, who speak English, live in urban areas and have fair education and income levels [20].

III. RESEARCH METHODOLOGY

This paper extended the TAM model with age, where three independent variables are predicting ITU. The research model adopted the robust PU and PEOU from the original TAM, and added age as an independent variable also. The only dependent variable proposed is ITU, where the depiction of this research is shown in Figure 1. The following hypotheses are developed and tested in this research:

H1: PEU will significantly impact citizens' intention to use e-government web site.
H2: PU will significantly impact citizens' intention to use e-government web site.
H3: Age will significantly impact citizens' intention to use e-government website.

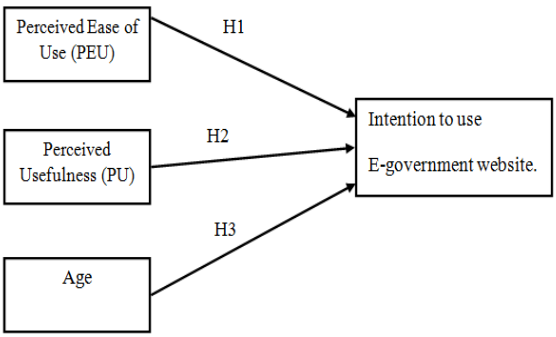

Fig. 1. TAM research model and hypothesis

In order to answer the research question and test the hypotheses, the authors developed a survey that includes items measuring the research constructs. The questions utilized a five-point Likert scale with 1 presenting "strongly disagree" and 5 presenting "strongly agree". The survey developed based on the literature and improved after a pilot test. The survey was distributed in Arabic language due to the fact that respondents are Arab and Arabic language is the mother language of Jordanian citizens. The first part of the survey included demographic questions about the respondents' gender, age, and education.

The surveys were distributed by hand (paper 300 surveys) and online using Google documents (50 surveys). A stratified sampling process was used to guarantee a distribution of age categories, where citizens with age less than 25 years to above 46 years are targeted more. The total number of responses collected from both paper and Google surveys was 350.
A visual inspection was conducted and removed 10 surveys with severe missing data to end up with a total number of usable surveys equal to 340. The demographic data of the sample is shown in Table 1.

TABLE I. DEMOGRAPHIC FREQUENCY STATISTIC

Gender	**Count**	**%**
Male	141	41.5%
Female	197	57.9%
Missing	2	0.6%
Total	340	100%
Age	**Count**	**%**
Less than 25	120	35.3%
25-35	57	16.8%
36-45	59	17.4%
More than 46	104	30.6%
Total	340	100%
Education	**Count**	**%**
High School & diploma	93	27.4%
Bachelor	196	57.6%
Master/PhD	51	15.0%
Total	340	100%

Data Analysis and Discussion

The means and standard deviations of all items measuring the TAM constructs are shown in Table 2. Also, the variable means are shown after each set of items, where the highest total variable mean is 3.43 (perceived ease of use), and the lowest is 3.23 (intention to use).

Regarding the highest and lowest mean of individual items, results indicated that item PU3 "Using e-government website allows me to access more government services." yielded the highest mean (3.52), while PU2 "The results of using e-Government website are apparent to me." yielded the lowest

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mean value (3.20). Also, PEOU3 "Learning how to use e-government website to access government services is easy for me", yielded the highest mean value (3.54), while PEU2 "My interaction with e-government website to access government services is clear." yielded the lowest mean value (3.29).

Finally, item ITU2 "I predict to use e-government web site in the future." Yielded the highest mean value (3.39), and ITU1 "I intend to use e-government web site continuously" yielded the lowest mean value (3.06).

The correlation matrix is used to determine if any two variables are associated to each other, and to check that independent variables are not extremely related. Table 3 depicts the Pearson Bivariate correlation matrix. Results indicate that age is negatively related to ITU, but not significantly related to PU and PEU. This means that as the age of citizens' increase, their intention to use e-government website is decreased. On the other hand, a significant correlation exists between the three original TAM constructs.

TABLE II. DESCRIPTIVE STATISTIC FOR TAM ITEMS.

Item description	Mean	Std. Dev.
PEOU1: My interaction with e-government website to access government services is clear.	3.29	1.27
PEOU2: I find it easy to use e-government web site to find what I want.	3.49	1.08
PEOU3: Learning how to use e-government website to access government services is easy for me.	3.54	1.09
PEOU4: Overall, I find using e-Government website to access government services easy to use.	3.41	1.18
Perceived ease of use	3.43	
PU1: Using e-government web site enables me to access government services more quickly.	3.44	1.36
PU2: The results of using e-Government website are apparent to me.	3.20	1.27
PU3: Using e-government website allows me to access more government services.	3.52	1.23
PU3: Overall, I find e-government website useful for me to access government services.	3.31	1.41
Perceived usefulness	3. 37	
ITU1: I intend to use e-government web site continuously.	3.06	1.30
ITU2: I predict to use e-government web site in the future.	3.39	1.19
ITU3: I plan to use e-government web site in the future.	3.22	1.36
Intention to use	3.23	

TABLE III. PEARSON BIVARIATE CORRELATION MATRIX.

Variable name	(ITU)	(PU)	(PEU)
Intention to use	1		
Perceived usefulness	.338**	1	
Perceived ease of use	.423**	.472**	1
Age	-.194**	-.082	-.074

**. *Correlation is significant at the 0.01 level (2-tailed).*

The research also conducted multiple regression analysis to find the prediction level of ITU utilizing the three independent variables. Table 4 depicts the results of multiple regression analysis (the coefficient table), where the result of the ANOVA test yielded an R2 value equal to 381.812, with an $F_{3,337} = 32.788$, with a p value < 0.000. As shown in the table, the independent variables were statistically significant in predicting ITU. The standardized beta values of each variable are the following: PU = 0.169, with a *p* value less than 0.01; PEOU = 0.331, with a *p* value less than 0.001, and age = -0.155, with a *p* value less than 0.01. Such result indicates a full support of the original TAM and the research hypotheses proposed by this work.

TABLE IV. MULTIPLE REGRESSION ANALYSIS

	Unstnd. Beta	Stand. Beta	t	Sig.
Constant	1.506		5.81	.000
PEU	.421	.331	6.06	.000
PU	.177	.169	3.09	.002
Age	-.132	-.155	-3.22	.001

IV. CONCLUSIONS AND FUTURE WORK

This paper supported the TAM findings, where perceived ease of use and perceived usefulness are significant predictors of the intentions to use e-government services. This result conforms to the findings of previous research [21]. Our

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extension of TAM, age, yielded also significant prediction of ITU, but with a negative direction. Such results support our premise that older citizens will have lower intentions to use e-government services. Certain aspects of the TAM are emphasized more than others, but still all items used were perceived moderately by respondents (all means of items used were between 2.33 and 3.66, based on a 5 point Likert scale).
Based on the comments of respondents and the results of this empirical test, the authors recommend that the success of e-government project is the responsibility of more than one party in community. The success of e-government projects depends on citizens adoption and attitudes, but still ministries that are responsible for providing such services are responsible too (like Ministry of ICT and other ministries that provide services through e-government website). The age divide might be the direct cause of this result, where governments need to build some effort to enhance the access level and the knowledge and skill needed to utilize e-government services through various ICT and the Internet. Government should pay more attention to the effect of age on the intention of Jordanians to use e-government services through the following propositions: holding workshops across Jordan to focus on the benefits and advantages of using e-government services especially to seniors, raise awareness to the importance of e-government projects, and conduct training programs to senior citizens on how to use technology.

This research is based on quantitative results, where a survey with forced choices to each item. Such issue limits the results of interaction of seniors with surveys and has some caveats. So future research should take into consideration this point and utilize qualitative methods such as interviews to get more and rich information from senior, where seniors in our culture like to talk more than read, and they express their opinions better through face to face setting. Also, as proposed by [22], other factors can contribute to the success of e-government that are related to environment and infrastructure.

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