

THESIS OF THE DOCTORAL (PhD) DISSERTATION

FACTORS AFFECTING E-GOVERNMENT ADOPTION: A COMPARATIVE STUDY OF JORDAN AND HUNGARY

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1. INTRODUCTION , PROBLEM STATEMENT, OBJECTIVES AND HYPOTHESIS

Today, the internet nowadays has become one of the most essential success tools of any commercial or governmental institution, and that why it has become necessary and must for any private or governmental organization to take advantage of the use of the internet to provide the best services to stakeholders and citizens. The information and communications technology (ICT) revolution in the eighties and nineties changed all aspects of human life, and one of that is the characteristics of interaction between governments and citizens, and since the advent of the ICT, the public and private sectors have competed on the best ways to exploit new technologies to enhance the level of services provided and relationships with stakeholders. Generally, the private sector always showed more tremendous enthusiasm and more use of ICT means in transactions and interactions, in contrast to the public sector, which showed a lot of caution and hesitation in the beginning, but this caution and hesitation did not last for long. Many governments in the early decade of the twenty-first century began to adopt more ICT and launched what called "e-government projects", as many experts point out that the beginning of the term "electronic government" appeared in the '90s, but the real beginning of the spread of electronic governments began at the beginning of the twenty-first century.

Previous studies have shown many definitions of e-government, but most of the definitions agreed that it is the public sector's use of technology and communication means to provide services to stakeholders and citizens (United Nations, 2002). The application of any system is not considered helpful if users do not use it. Since the e-government emerged, there's always a challenge to increase users' acceptance of the services provided by these governments through their channels. Many factors may affect the level of acceptance of electronic services, some of which are related to users' perceptions, about the system itself , some of them linked to the system infrastructure, and finally, the users' trust in the system or the government itself.

E-government Area of Services

The online-based government transactions might be available in different service areas through which the governments could interact with their stakeholders. Four main service areas are present in all the e-government projects (Figure 1.).

Government-to-Government (G2G): The interaction in this area inside the government itself between the governmental institutions, departments, or organizations at the local and national levels, and through this interaction, these agencies share data, information, and services and that improve the communications and the access to the information.

Government-to-Citizen (G2C): The interaction in this area is between the governmental institutions and citizens, and through this interaction, the government provides services and information using ICT in an effective, easier, and faster manner, and the services provided, such as registering births and deaths, registering the marriage, issuing certificates, and more other services.

Government-to-Business (G2B): This interaction occurs between the government and the commercial sector. It includes purchasing/procurement, regulations of business activity, dissemination of policies, memos, government rules and regulations, application forms, license registration or renewal, and tax payments.

Government-to-Employee (G2E): It refers to all the interactions that occur between the government and its employees. It includes issues related to salary, superannuation, welfare schemes and housing, online conference for the employees, online training, and employee information (Jeong, 2007).



Figure 1. E-government Area of Services Source: (Nations, 2004)

The greater concern of governments around the world is how to improve the level of acceptance and improvement of services provided to citizens (G2C). This research seeks to understand a deeper understanding of the factors that affect acceptance in the two countries, Jordan, and Hungary.

Benefits of E-Government

Most of the governments across the world have recently realized that there are numerous advantages for the e-government. They have tried to achieve a full-scale function for the e-government to maximize their benefits. There are findings that reported that the e-government benefits are very similar in developed and developing countries (Omar Al Hujran, Anas Aloudat, 2013). Additionally, the e-governments have allowed their businesses, government employees, and citizens to have access to the portal of the government for 7 days a week and 24 hours a day. There was a conclusion that both the government and people can advantage from implementing the e-government. According to Almarabeh & Abuali, 2010, these benefits are summarized as in the following:

- Understand the needs of the user more and thus provide him with better and easier services over the internet.
- Services are always available to users 24/7.
- It contributes to enhancing trust between governments and their clients by involving them in the decision-making process, accessing information, and enhancing the transparency and accountability of the government.
- It contributes to fighting corruption and promotes equality among citizens by accessing information and services.

- E-government enables users to obtain services and access information easily anywhere.

Alsaif, (2014) suggested that most of the advantages that are associated with the e-government systems are centered on decreasing the administration corruption and increasing transparency, which are considered a good potential to enhancing the overall effectiveness and efficiency of government services. He concluded that enhancing the service delivery of the government is one of the most fundamental factors for improving the performance of public services. Similarly, Alharbi, (2016) mentioned It is likely that there will be a significant improvement in efficiency if the costs and human errors are reduced and if the internal processes are streamlined. There could also be similar improvements in the content, accessibility, and transactions of the service delivery.

Problem Statement

All developed countries are interested in e-government to improve the performance and productivity of the public sector, and this interest has increased dramatically in recent times with the entry of the world under the influence of the Corona pandemic in early 2020, as many government transactions and activities in the world have turned to the electronic form. In the same context, developing countries such as Jordan have sought to improve the e-government program to improve performance, increase transparency and accountability, and reduce the high corruption rates in the country.

Many previous studies, especially United Nations reports, indicated that most e-government programs in developing countries have failed to achieve their goals, and Jordan is not an exception, as its project is still classified as a failure, and recent reports have emerged that 67% of people in Jordan do not know about the program or even the sites associated with it. In addition, another report showed that more than 85% of Jordanians have not logged into the e-government websites or even the websites related to it (UN DoESA, 2016). Moreover, it was reported that more than 85% of the Jordanian people never logged in to the e-government website or did not find any information. Moreover, a survey prepared by the National Committee for Women's Affairs and the International Labor Organization in 2020 for 2,454 participants in Jordan who used the electronic platforms showed that 54% of them still face problems using these platforms (Alghad, 2020). Thus, although the Jordanian government has set up lots of projects to develop the spread of e-government, the people in Jordan were still negligent of their availability (Al-Hujran, Al-dalhmeh, & Aloudat, 2011).

On the other side, Hungary is considered advanced compared to Jordan in this field, and this appears clearly in the United Nations survey of e-governments, where Hungary ranked 52 last year. However, according to the same classification, Hungary has regressed since 2010, where it was ranked 27th, and this decline confirms the presence of some challenges that the program faces, especially in citizens' acceptance of e-government services and participation.

Moreover, in 2017 European Commission report showed that only 44% of individuals downloaded forms electronically but approximately only 27% submitted these forms electronically to the public institutions'

websites and In the latest report of the European Commission, showed that this percentage in the year 2020 increased to 38% (European Commission, 2020; European Union, 2017). However, in another study, only 17% of the respondents to the questionnaire indicated that they use the Internet to make government transactions (Ariosz, 2013). In addition to that, the use of electronic services in Hungary depends on client gate registration, and a European Commission study has shown that only 22% of adults in Hungary have made this registration on the client gate until 2017 (EuropeanCommission, 2017).

In summary, a considerable study investigated the variables that directly affect citizens' acceptance of government-provided services electronically; however, it is not clear if these factors are user-related factors and the users' perceptions about the system or infrastructure-related factors or related to the trust. Therefore, the present study attempts to understand the factors that influence the users' adoption of e-government, especially in two different contexts.

Objective and Hypothesis

In general, this study aims to identify the main factors that affect users of the e-government program to adopt the use of services provided by the government in electronic form from various aspects (human perceptions, infrastructure, and trust) in Jordan and Hungary and to achieve this goal the research formulated four main objectives:

- Explore the factors that affect the e-government acceptance in Jordan and Hungary.
- Explore the main factors related to human perceptions that affect the e-government acceptance in Jordan and Hungary.
- Explore the main factors related to system infrastructure that affect the e-government acceptance in Jordan and Hungary.
- Explore the main factors related to trust that affect the e-government acceptance in Jordan and Hungary.
- Create a new framework for e-government acceptance for both countries.

To achieve this study goal, the researcher formulated four main hypotheses:

- ***H1: There is a significant relationship between Human-E government (performance expectancy, effort expectancy, awareness of the system, social influence, Habit) interaction and citizens' adoption of the e-government system in both countries.***
- ***H2: Experience moderates the relationship between human-E government interaction and e-government adoption.***
- ***H3: There is a significant relationship between E-government Infrastructure(system enjoyment, flexibility, system interactivity, facilitating conditions) and citizens' adoption of e-government systems in both countries.***
- ***H4: There is a significant relationship between trust(trust in the system, trust in government) and the citizens' adoption of e-government in both countries.***

Structure of processing the research topic

This research will be five chapters (Figure 2). Chapter 1 presents an overview of the study. Chapter 2 discusses the array of studies and theories are related to e-government adoption. Chapter 3 introduces the research framework and pilot study. Chapter 4 states the main results and test the hypothesis. Chapter 5 discusses the findings and highlights the key managerial and theoretical implications of the study Chapter 6 states the main conclusion and the new results of the study and, finally, a summary and recommendations.

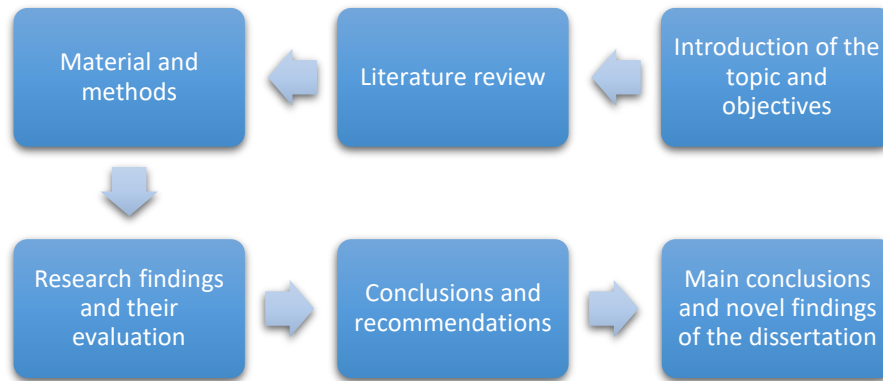


Figure 2: The research structure (own editing)

2. METHODOLOGY

The success of any electronic system fails unless the users use it. Acceptance and use of the system are followed by the adoption of the system, which is the first decision that the user takes to use the new system (Venkatesh, Morris, Davis, & Davis, 2003). Many previous studies review models for accepting any new technology or system in the public sector, either by applying well-known theories on technology acceptance or even amended it, and most of these studies are applied in developed countries (Alsaif, 2014; Alshehri, Drew, Alhussain, & Alghamdi, 2012; Elsheikh, 2012). The most prominent models and theories dealing with technology acceptance are: Theory of Reasoned Action (TRA), Theory of Planning Behavior (TPB), Technology Acceptance Model (TAM), Motivational Model (MM), Unified Theory of Acceptance and Use Technology Model (UTAUT), Unified Theory of Acceptance, and Use Technology Model 2 (UTAUT2).

2.1. The reasons of why using the UTAUT for this research

All the models we mentioned provide explanations of the factors that affect the users' decision to adopt and accept new technology. The current study adopts the model UTAUT2 for many reasons, including:

1. The model is comprehensive, as it is supported by many previous theories. In addition, this model merged 8 previous models (TRA, TAM, TPB, MM, C-TAM-TPB, MPCU, IDT, SCT) to explain the users' acceptance of the technology.

2. The model is more accurate than the previous models, as the model showed an interpretive capacity of up to 70%. On the other hand, the previous models showed an explanatory capacity estimated at 40% of the cases studied. Besides, the model showed more flexibility in comparison to other models in the field of measuring the acceptance of new technology. (Venkatesh et al., 2003).
3. As indicated by many previous studies, the model can be applied in different environments and contexts such as countries, systems or community groups. This makes this model able to explain and apply more widely than the user's use of technology only.
4. The model has demonstrated great applicability in several previous studies (Al-Shafi & Weerakkody, 2010; Rahim & Athmay, 2013; Yahya, Nadzar, & Rahman, 2012).
5. In the end, and in the context of the current study, which is the public sector, this model was tested mainly in developed countries, and much less extent in developing countries such as Jordan, or as a comparison between two countries such as Jordan and Hungary with many differences in cultural and environmental.

2.2. Conceptual Development of Framework

The original model UTAUT2 addresses the various factors that may affect the user's intention to accept and adopt any new system, but this model does not address the impact of factors related to trust that may be a plays an important role in affecting users' acceptance of the system, especially when it comes to services in the public sector because trust in the system is must for the direction of users to use this system because they will use their data and personal information. As for the current study, the context of the study is the e-government in both Jordan and Hungary, and trust can play either in the system or the government that provides services with an important factor may effect on the users' decision to accept and use the system (Spacek et al., 2020; Csótó, 2019; Al-Hujran et al., 2015).

Finally, the current study added another variables related to the system characteristics and related to the Awareness which is usually the first stage in using any system, the awareness which the knowledge of the importance of the system to the users and knowing the benefits that may accrue to them from using the system, which leads to the adoption of the system at the end (Pavlou & Fygenson, 2006), and this is confirmed by many previous studies (van Dijk, Peters, & Ebberts, 2008), divided the process of adopting the system into four main phases, and in the first phase were: knowing the system, encouragement, decision, and finally using, moreover, Shareef, Kumar, Kumar, & Dwivedi, (2011) indicated that the starting point in the process of adopting any system is to know it and take a complete picture of it. and they mentioned that belief in the system is the most important factor affecting the user's decision to adopt the system.

2.3. Proposed Research Framework

The current study adopted the model UTAUT2 after excluding some elements and expanding it by adding three new elements as we mentioned previously, the first is related to the system, the second is related to awareness and the last is related to trust. The added elements were extracted from previous studies (Figure 3).

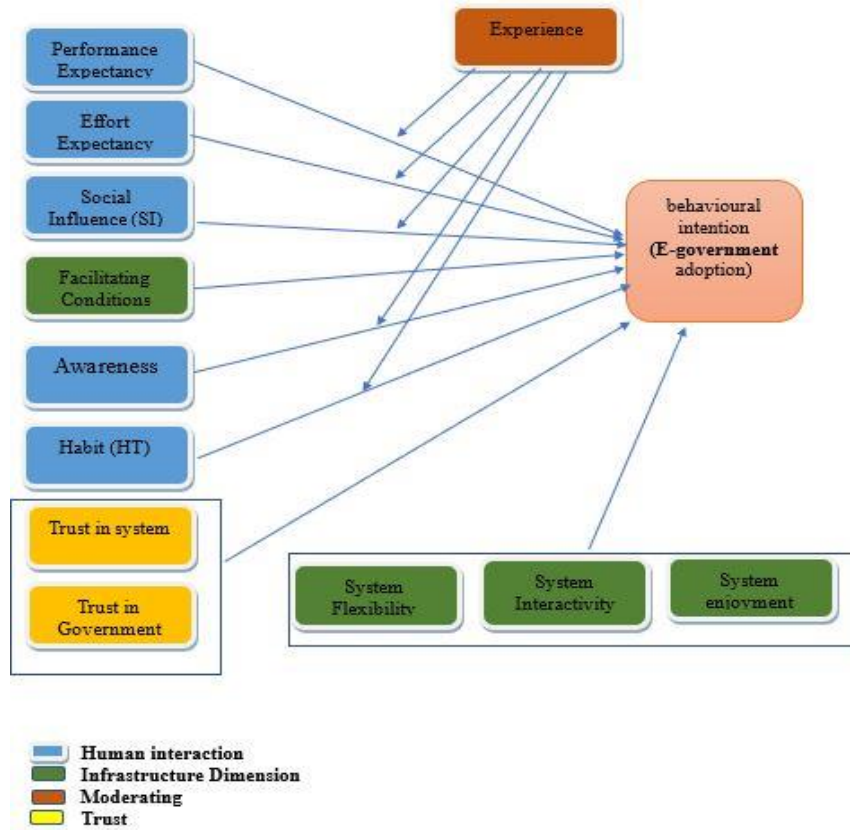


Figure 3. Proposed Research Model, Source: own edition

In this research, to make the framework easier, has grouped the variables under four basic complex variables:

- **Human E-government interaction** :effort expectancy (EE), performance expectancy, influence (SI), habit (H), awareness(AW).
- **Moderating:** Experience (EX).
- **E-government Infrastructure** :facilitating conditions (FC), system characteristics (system flexibility (SF), system Interactivity (SI), system enjoyment (SE)).
- **Trust:** trust in the system (TS), trust in government (TG);

2.4. Population and Sampling size

Many previous studies have shown that educated people who can use the internet are the ones who are the first to use any technological system (Al-Hujran et al., 2011) and these early adopters play the most important role to measure the success of the system, and as Al-Hujran et al., (2011) added that they will have a decisive role in motivating potential users to use the system. That the people who embrace technology, in the beginning, are the ones who value technology for its own.

Sample size and Instrument Design (pilot study)

Determining the sample size for the pilot study is an important factor for analyzing the variables later, and by referring to the previous studies, we found that most of the previous studies headed in two directions: the first is Sapnas & Zeller, (2002) which indicates that only 50 responses are sufficient for the pilot study, on the other hand, the second direction suggested that the required number must be proportional to the number of variables in the study, the rules of thumb range anywhere from 2: 1, 3: 1, 4: 1, 6: 1, 10: 1, 15: 1, or 20: 1 (Hogarty, Hines, Kromrey, Ferron, & Mumford, 2005; Tabachnick, Fidell, & Ullman, 2007). Based on the above, this study adopted the second direction, and accordingly, the suggested sample size for the pilot study is ($2 * 53 = 106$). A preliminary Instrument was designed to meet the research goal and consisted of (53) items where the Human-E government interaction variable (21) items, the E-government Infrastructure variable (14) items, the trust variable (8) items, the Experience variable (5) and the Behaviour Intention variable also consisted of (5) items. The study also contains a Hungarian and a Jordanian sample and the study instrument was distributed to 106 participants in Hungary and 106 participants in Jordan to ensure study Instrument is valid and reliable, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis tests applied (CFA).

The Result Of The Pilot Study

In this pilot test, the researcher removed the vague and confusing questions, determined the time taken to complete the survey, and checked for the proper sequencing of the questions. The feedback and Recommendations were used to finalize the content of the questionnaire. Several items were re-sorted to make them more convenient for the respondents. Several sentences were rephrased and reword to suit the objectives of the study, Finally, the researcher identified the common factors between the two countries to make a comparison.

This research suggested three main variables: Human E-government interaction (5 sub-factors), E-government Infrastructure (4 sub-factors), and trust (2 sub-factors). And From the previous studies, all the sub-factors that fall under these variables were identified, and after the pilot study, which went through two main stages: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis, tests applied (CFA) To confirm and extract the proposed factors under the main variables, sifting and sorting and finalizing the questionnaire for distribution to the final sample and finally create one joint model from common factors between the two countries to make a comparison. In the first stage (EFA), three tests were carried out:

- *Kaiser Criterion*: After distributed the questionnaire in both countries this analysis showed the common number of factors under two main variables in both countries: government Infrastructure three factors , two factors in trust, and in Human E-government interaction is two factors, and this results can make the compression possible with 7 shared factors in the final framework in both countries.

- *Screen Test*: It is a second analysis to confirm the results of the first analysis, and the results of this test confirmed the factors' numbers.

- *Extraction items of factors*: It is an analysis process to extract the factors and ensure the validity of the questionnaire questions confirmed in the previous two analyses. The results for the proposed factors were:

In both countries, the results showed one joint model for the comparison and the final framework shows that the system characteristics merged the three factors in two factors: System Interactivity and system flexibility, and excluded the system enjoyment. Moreover, from the original model: habit, awareness and social influence factors were excluded after the three analyzes test. after the three analyzes test as the final framework for both countries shows the 7 shared factors in both countries in Figure 4 which can make the comparison between the two countries possible in Chapter 5.

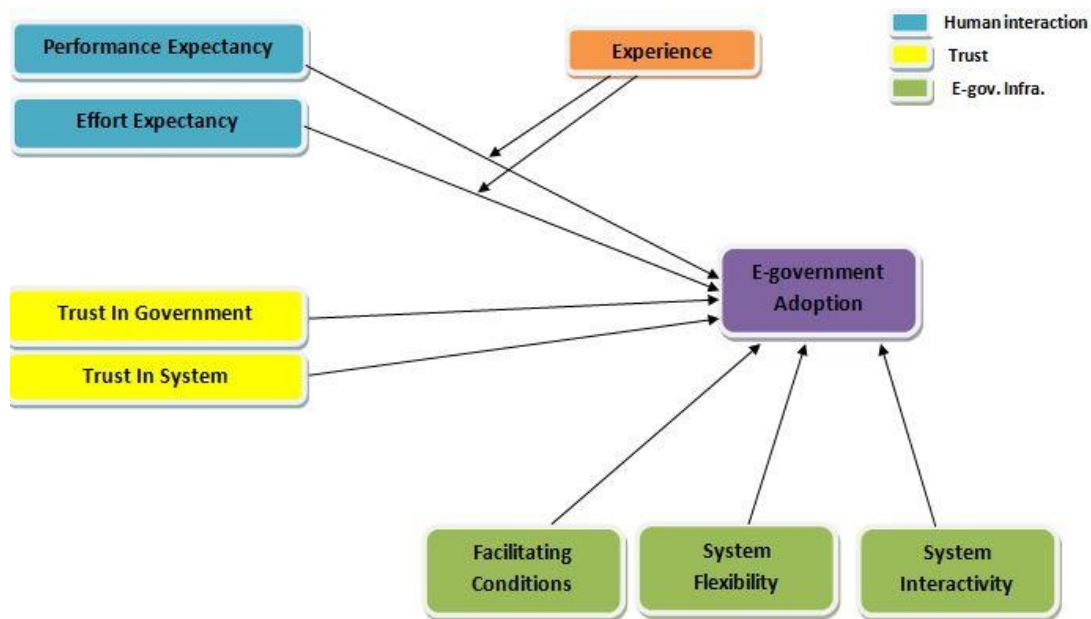


Figure 4. The final joint framework after the pilot study for the comparison (own editing).

Sample size

Subsequently, this study used a quantitative research method in the third stage, where questionnaires were distributed to collect data from citizens in Jordan and Hungary to measure the acceptance of e-government services. According to (Uma Sekaran, 2016), this type of data collection method (questionnaire) is more suitable, if the sample size is large and its subjects stay in a wide geographic area. The total number of the populations who have internet access for this study (Jordan 6.78 million, Hungary 7.5 million)(Global Digital Insights, 2020; Hungarian central statistics office, 2020). It would be ideal to conduct the study on the entire population of citizens in Jordan and Hungary. However, since the population is very large, it is impossible to include every member of the population. A sample of such population was used, which was based on the Yamane, (1967) equation which reveals that:

$$n = \frac{N}{1 + N(e)^2}$$

where n = sample of study, N = population of study, and e (precision) = 0.05. The sample size of this research population, where N is 10 m and 6 m citizens are therefore determined to be 351 for both countries as the previous equation applied.

The research sample

It was a challenge for the researcher to collect information from the selected sample, and for reasons related to the spread of the COVID19 virus, the researcher chose to use social media platforms to collect the data, specifically Facebook, and that is it is the most widespread in the two countries.

The researcher conducted a campaign on Facebook in mid-June until the beginning of July, and according to the indicators, the questionnaire link reached about 10,000 users, and the response can be estimated at a rate of 0.035 % in Hungary, In Jordan the link of the questionnaire reached about 8,000 users, and the response rate was around 0.044 %, the low percentage is since the respondents always neglect the electronic forms (Table 1).

Table 1 demographic data (Both countries) Own data

Demographic data	Categories	Count	%	Count	%
		Jordan		Hungary	
Gender	Female	226	63.5%	234	66.7%
	male	130	36.5%	117	33.3%
Education levels	Secondary school	19	5.3%	262	74.6%
	Bachelors' degree	240	67.4%	58	16.5%
	Master / Postgraduate degree	79	22.2%	25	7.1%
	PhD	18	5.1%	6	1.7%
	Total	356	100%	351	100%
Age groups	Under 25 years	154	43.3%	177	50.4%
	26-45	115	32.3%	75	21.4%
	46-55	7	2.0%	2	0.6%
	55 and above	80	22.5%	97	27.6%
	Total	356	100%	351	100%
Internet usage	About once a month	1	0.3%	1	0.3%
	A few times a month	3	0.8%	2	0.6%
	About once a day	16	4.5%	16	4.6%
	Several times a day	336	94.4%	332	94.6%
	Total	356	100%	351	100%
	Total	356	100%	351	100%

2.5. Discriminant and Convergent Validity (both countries)

The current study used the CFA technique to make and validate the measurement for the unobservable or latent variables. The CFA was created according to the theoretical search and understanding that determined the covariation and variation within the variables the study observed, which include indicators, latent variables, unobserved variables, and measurement errors (DeCoster, 1998). It identified if factors and loadings of the measured variables on them fit to what was expected according to pre-established theory. therefore, CFA tried to clarify the variation and covariation in a group of observed variables in terms of a set of theoretical and unobserved factors (Suhr, 2006).

Table 2. CFA (discriminant and convergent validity) Both countries

	Jordan sample		Hungarian sample	
Variables	CR	AVE	CR	AVE
Performance expectancy	0.931	0.775	0.912	0.724
Effort expectancy	0.841	0.570	0.840	0.636
System Interactivity	0.926	0.757	0.916	0.688
Facilitating conditions	0.911	0.775	0.901	0.696
System Flexibility	0.854	0.664	0.869	0.690
T.in. Sys.	0.946	0.813	0.810	0.681
T.in. Gov	0.977	0.916	0.757	0.628
Experience	0.833	0.557	0.764	0.723
Behavior Intention	0.875	0.638	0.793	0.823

Composite Reliability (CR) > 0.70, Average Variance Extracted (AVE) > 0.50 (Catalán, 2019; MacKenzie, Podsakoff, & Podsakoff, 2011; Shaffer, DeGeest, & Li, 2016)

In the Hungarian framework it shows that the (CR) of all the latent constructs is more than 0.70 and the average variance extracted (AVE) more than 0.50 and that confirms that the constructs have very good reliability and convergent validity (MacKenzie et al., 2011; Shaffer et al., 2016). Moreover, the Jordanian shows that the composite reliability (CR) of all the four latent constructs is greater than 0.70 and the average variance extracted (AVE) exceeded 0.50 showing very good construct reliability and convergent validity respectively (MacKenzie et al 2011) and (Shaffer et al, 2016).

The researcher examines the various items to identify those that have high loadings on the same construct and those that load highly on multiple constructs. Thus, to establish discriminant validity at the item level means there is a high correlation between items of the same construct and a very weak correlation between items of a different construct. As simple as this approach is, it has no theoretical justifications or empirical proof (Henseler, Ringle, & Sarstedt, 2015).

2.6. Reliability (both countries)

Table 3. Reliability of instrument of E-government acceptance using Cronbach alpha method for internal consistency

Main factors	Dimensions	No. of items	Cronbach alpha	No. of items	Cronbach alpha
		Hungarian sample		Jordan sample	
Human - E-government interaction	Performance expectancy	4	0.818	4	0.713
	Effort expectancy	3	0.710	4	0.750
E-government Infrastructure	Facilitating conditions	3	0.791	3	0.861
	System Interactivity	5	0.762	4	0.821
	System Flexibility	3	0.701	3	0.701
Trust	Trust in system	3	0.753	4	0.781
	Trust in government	3	0.736	4	0.722
Experience		3	0.769	4	0.719

Table.3 shows the reliability results for the dimensions representing with Cronbach alpha technique for internal consistency. The values of came between (0.701-0.861) and that is a high result and confirm high reliability. The values to be accepted and reliable have to be greater than 0.60(> 0.60) which is acceptable reliability and in the last table most the values were > 0.70 and that means the current values confirm high reliability according to (Santos, J. Reynaldo A., 1999). Also, multivariate normality assumption is met by values of Skewness and Kurtosis, and these values within acceptable range ± 1 for Skewness and ± 2.5 Kurtosis (Hair et al., 2006). As all measurement models were validated via CFA with high reliability.

3. SCIENTIFIC FINDINGS

This research tested four main hypotheses for the joint model. This part would discuss if the dataset supported these hypotheses according to the structural equation modeling analysis results. The conceptual study model in Figure 5 (**Jordan**) and Figure 6 (**Hungary**) showed the standardized regression weights of the relationships between exogenous and endogenous variables. The significant relationship between exogenous and endogenous variables is shown alongside the "*" star. The conceptual study model depicted in Figure 5 and Figure 6 illustrates the standardized regression weights of the relationships between variables as the detailed results come in the next two sections.

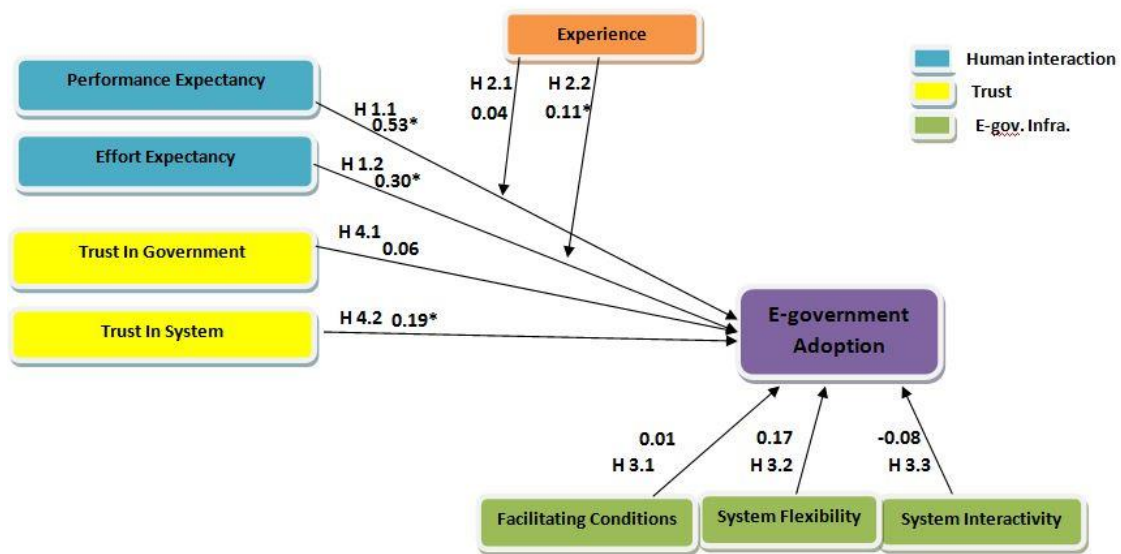


Figure 5. Hypothesized pathways in Jordan with SRC, *P < .0 (own editing)

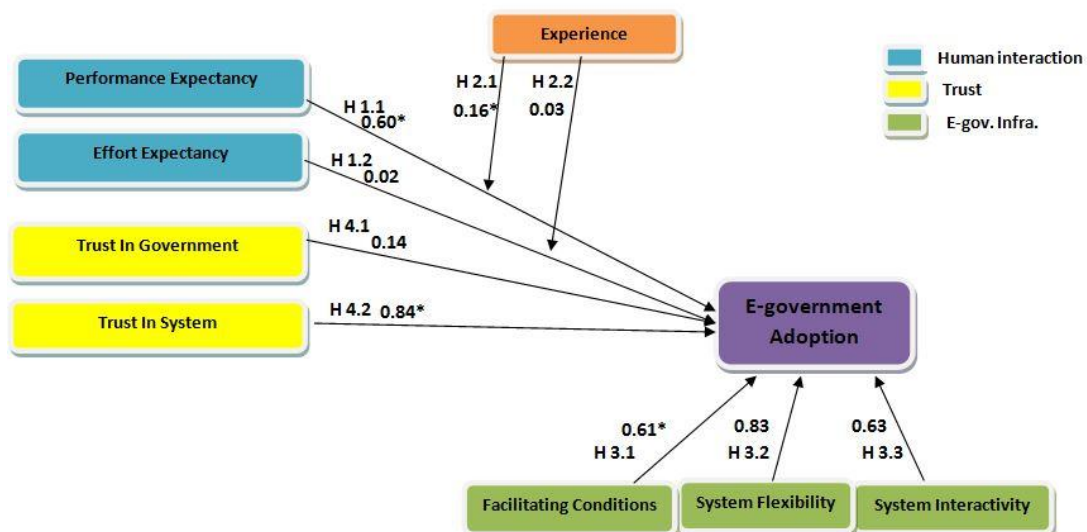


Figure 6. Hypothesized pathways in Hungary with SRC, *P < .0 (own editing)

Hypotheses Testing Results (Both countries)

- **First main hypothesis: The dimensions of Human E-government interaction have a positive influence on Behavioral Intention to adopt e-government applications.**

H1.1: Performance expectancy has a positive influence on Behavioral Intention to adopt e-government applications.

The first sub-hypothesis was about the relationship between Performance expectancy and Behavioral Intention to accept e-government applications. **in Jordan** The study's findings showed that Performance expectancy was positively and significantly related to the Intention to adopt e-government applications in Jordan, and which obvious through the standardized regression weight, which was 53% at the confidence level of 0.95 and p-value of <0.05 . in other words, the results show that **the research data supported the hypothesis**. Moreover, the URW within the research variables was 0.534, which means that one unit in Performance expectancy led to a 0.534 unit increase in Intention to adopt e-government applications in Jordan. **In Hungary**, the results show a 60% standardized regression weight at a 0.95 confidence level and a p-value of <0.05 . **The research data supported the hypothesis**. Moreover, the URW of 47.5% among the study variables means that if Performance expectancy increased by one will led to a 47.5% increase unit in Intention to adopt e-government applications in Hungary.

H1.2: Effort expectancy has a positive influence on Behavioral Intention to adopt e-government applications.

The second sub-hypothesis was about the relationship between Effort expectancy and Intention to adopt e-government applications. **in Jordan** The study's findings showed that Effort expectancy influences Behavioral Intention to adopt e-government and which obvious through the standardized regression weight, which was 30% at the confidence level of 0.95 and p-value of <0.05 . in other words, **the results show that the research data supported the hypothesis**. Moreover, the URW within the research variables was 0.287, which means an increase by one unit in Effort expectancy led to a 0.287 unit increase in Intention to adopt e-government applications. **In Hungary**, the research results found that Effort expectancy did not influence behavioral intention to adopt e-government with only 2% standardized regression weight at 0.95 confidence level and a p-value of >0.05 . which means the results confirm that **the hypothesis did not support by the study data**.

- **Second main hypothesis: Experience moderates the relationship between Human E-government interaction and Behavioral Intention to adopt e-government applications, and the relationship becomes more positive when the experience is high.**

which means the relationship between them when the experience is high, the relationship becomes more positive. It divides into four hypotheses moderation hypotheses with multiple moderated regression by Amos program, followed by Marsh recommendations (Marsh, Wen, & Hau, 2004). the dimensions of Human E-government interaction, Experience, and Behavioral Intention were mean-centered before

entering the analyses. Three steps were followed. First, convert variables scores to z scores. Second, we added the interaction term between the dimensions of Human E-government interaction and Experience. Third, import and draw three variables from SPSS into Amos at all phases of testing moderator variables, Moderation results are displayed in Tables (4.7 till 4.10), and Figures (4.2- 4.4) showed the interaction effects. Low and high values of the predictor and moderator variables represent values one standard deviation below and above the mean, respectively.

H2.1: As the value of the experience increases, the relationship between Performance expectancy and Behavioral Intention to adopt e-government applications also increases.

The first sub-hypothesis was about the interaction between experience and Performance expectancy, and it will be impacted positively in the relationship between Performance expectancy and Behavioral Intention to use e-government applications. **in Jordan** The findings of the study showed that the interaction between experience and performance expectancy was not significant ($\beta = 0.04, p > 0.05$). **This result is not supported H2.1.**

In Hungary, the findings of the study showed that the interaction between experience and performance expectancy was significant ($\beta = 0.162, p < 0.05$) Simple slope analysis (Figure 4.3) revealed that performance expectancy was positively related to Behavioral Intention when there was a high experience in e-government application (URW = 0.112, $p < 0.05$). When there was low performance expectancy, also the relationship between performance expectancy and Behavioral Intention becomes low. In other words, experience positively moderates (amplified) with 16.2% of that relationship. **These results support H2.1**

H2.2. Experience moderates the relationship between Effort expectancy and Behavioral Intention to adopt e-government applications, such that the relationship becomes more positive when the experience is high.

The second sub-hypothesis was about the interaction between experience and effort expectancy, and it will be impacted positively in the relationship between Effort expectancy and Behavioral Intention. **In Jordan** the findings of the study showed that the interaction between experience and effort expectancy was significant ($\beta = 0.11, p < 0.05$) Simple slope analysis (Figure 4.13) revealed that effort expectancy was positively related to Behavioral Intention when there was a high experience in e-government application (URW = 0.084, $p < 0.05$). Also, when there was low effort expectancy, the relationship between Effort expectancy and behavioral intention becomes low. In other words, experience positively moderates (amplified) with 11% of that relationship. **These results support H2.2 in Jordan. In Hungary**, the research results showed that the interaction between experience and performance expectancy was not significant ($\beta = 0.03, p > 0.05$); **this result is not supported H2.2.**

- **Third main hypothesis: The dimensions of E-government infrastructure positively influence Behavioral Intention to adopt e-government applications.**

H3.1: Facilitating conditions have a positive influence on Behavioral Intention to adopt e-government applications.

The first sub-hypothesis investigates the relationship between Facilitating conditions and behavioral intention to use e-government applications. **In Jordan** the analysis showed that System Interactivity was not statistically impacted on behavioral intention to adopt e-government with an -8% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, the results indicated that **the study data did not support the hypothesis**.

In Hungary, the research results confirmed that Facilitating conditions and Intention to adopt e-government applications in Hungary were positively and significantly related. It is obvious through the standardized regression weight, which was 61.2% at the confidence level of 0.95 and the p-value <0.05 , which means **the results confirmed the hypothesis and supported it by the research data**. Moreover, the URW within the study variables was 69.1%, which also means if Facilitating conditions increased by one unit will increase by 69.1% unit of in Intention of the citizen to adopt e-government applications in Hungary a very high percentage.

H3.2: System Interactivity has a positive influence on Behavioral Intention to adopt e-government applications.

The second sub-hypothesis was about the relationship between System Interactivity and Intention to adopt e-government applications. **In Jordan** the study's findings showed that System Interactivity was not statistically impacted on behavioral intention to adopt e-government with a 1% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, the results indicated that **the study data did not support the hypothesis**. **In Hungary**, the study's findings showed that System Interactivity was not statistically impacted on Behavioral Intention to adopt e-government with an 83.1% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, **the results indicated that the study data did not support the hypothesis**.

H3.3: Flexibility of E-government System has a positive influence on Behavioral Intention to adopt e-government applications.

The third sub-hypothesis examined the relationship between System Flexibility and Intention to adopt e-government applications. **In Jordan** the study's findings showed that System Flexibility was not statistically impacted on Behavioral Intention to adopt e-government with a 17% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, the results indicated that **the study data did not support the hypothesis**. **In Hungary**, the research results showed that System Flexibility was not statistically impacted on Behavioral Intention to adopt e-government with a 62.9% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, **the results indicated that the study data did not support the hypothesis**.

- **Fourth main hypothesis: The dimensions of trust positively influence behavioral intention to adopt e-government applications.**

H4.1: Trust in the e-government system positively influences behavioral intention to adopt e-government applications.

The first sub-hypothesis examined the relationship between Trust in the e-government system and Behavioral Intention among citizens toward e-government application. **In Jordan** the study's findings showed that Trust in the e-government system was positively and significantly related to Intention to adopt e-government applications in Jordan, which was obvious through the standardized regression weight, which was 19% at the confidence level of 0.95 and p-value of <0.05 . in other words, **the results show that the research data supported the hypothesis**. Moreover, the URW within the research variables was. 17.4% means that an increase by one unit in Trust in the e-government system led to a 17.4% unit increase in Intention to adopt e-government applications.

In Hungary, the research results confirmed a positive and significant relation between Trust in the e-government system and Intention to adopt e-government applications in Hungary, and that obvious through the standardized regression weight what was 84.5% at the confidence level of 0.95 and a p-value of <0.05 . that means **the results confirm the hypothesis and are supported by the research data**. Moreover, the URW within the research variables was 80.2%, which means that if Trust in e-government system increase by one will lead to an increase by 80.2%, unit increase in the Intention of students to adopt e-government applications in Hungary is a high percentage.

H4.2: Trust in government has a positive influence on Behavioral Intention to adopt e-government applications.

The second sub-hypothesis was about the relationship between Trust in government and Intention to adopt e-government applications. **In Jordan**, the study's findings showed that Trust in government did not statistically impact behavioral intention to adopt e-government with a 6% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, the results indicated **that the study data did not support the hypothesis**.

In Hungary, the study's findings showed that Trust in government did not statistically impact behavioral intention to adopt e-government with a 13.6% standardized regression weight at 0.95 confidence level with a p-value of >0.05 . Thus, **the results indicated that the study data did not support the hypothesis**.

Hypotheses results for both countries

After we got introduced with the factors that affect the adoption of e-government in the two countries separately in the previous paragraphs, here is table 4 showing the results of the hypotheses for the joint model between the two countries.

Table 4. Hypotheses results for the joint model (Hungary and Jordan) (own editing).

	Hypothesis	Hypotheses acceptance
H1	There is a significant relationship between Human-E government interaction and citizens' adoption of the e-government system.	Partly supported
H1.1	Citizens' adoption of e-government services will be significantly affected by performance expectancy.	Supported
H1.2	Citizens' adoption of e-government will be significantly affected by effort expectancy.	Not Supported
H2	Experience moderates the relationship between human-E government interaction and e-government adoption.	Partly Supported
H2.1	Experience positively moderates the relationship between Performance expectancy and e-government adoption.	Not Supported
H2.2	Experience positively moderates the relationship between effort expectancy and e-government adoption.	Not Supported
H3	There is a significant relationship between E-government Infrastructure and citizens' adoption of the e-government system.	Not Supported
H3.1	There is a significant relationship between the facilitating conditions and citizens' adoption of the e-government system.	Not Supported
H3.2	There is a significant relationship between system interactivity and the citizens' adoption of e-government	Not Supported
H3.3	There is a significant relationship between the flexibility of e-government systems and the citizens' adoption of e-government	Not Supported
H4	There is a significant relationship between trust and the citizens' adoption of e-government.	Partly Supported
H4.1	There is a significant relationship between trust in the system and the citizens' adoption of e-government.	Supported
H4.2	There is a significant relationship between trust in government and the citizens' adoption of e-government.	Not Supported

The final results of the hypotheses (both countries) came to answer the original questions of this research as the following:

- First research question: What is the main factors affecting E-government acceptance in Jordan?

In Jordan, the results showed the effect of three factors and one moderating. First, two factors: **performance expectancy** and **effort expectancy**, from the first dimension Human E-government interaction, second, the effect of the factor **trust in the system** from the third dimension Trust, and finally a limited effect of the moderating variable on the relationship between effort expectancy and e-government adoption.

- Second research question: What is the main factors affecting E-government acceptance in Hungary?

In Hungary, the results showed also an effect of three factors and one moderating. First factor: **performance expectancy**, from the first dimension Human E-government interaction, second factor, the effect of the factor **facilitating conditions** from the dimension E-government Infrastructure, the third factor is **trust in the system** from the third dimension Trust, and finally a limited effect of the moderating variable on the relationship between effort expectancy and e-government adoption.

- Third question: What are the main differences or similarities factors in Jordan and Hungary?

The results between the two countries were more similar, as from eight joint relationships, the results were similar in five relationships, and the results differed regarding three other relationships.

Similarities: the effect of five relationships between the factors: performance expectancy, trust in the system, trust in government, flexibility, system interactivity, and E-government adoption

Differences: the effect of three relationships between the factors: effort expectancy, facilitating conditions, experience (moderating), and E-government adoption.

4. CONCLUSIONS, SCIENTIFIC CONTRIBUTION, AND RECOMMENDATIONS

4.1. Conclusion

This study reports empirical research on citizen adoption of e-government services in Jordan and Hungary. It is inspired by the low-level individual acceptance of e-government systems in developing countries. E-government systems cannot boost public service quality until the public uses them. Therefore, this study's key goal is to achieve a deeper understanding of factors affecting the use of e-government services by people. Identifying those variables can increase the probability of growing the acceptance of these programs by deepening awareness of factors that promote or impede the adoption process.

The second explanation for this analysis is the limited longitudinal e-government implementation studies focused on adopting such services in developing countries like Jordan. Filling this void in literature is also one reason for undertaking this research in a country like Jordan, and compare it to Hungary, which has the same population number and the same size with different cultural and social values.

After the comprehensive literature analysis, this thesis established a theoretical model. This model combines UTAUT2 with other variables collection of infrastructure and trust. An internet survey was used to empirically validate the proposed model due to the coronavirus pandemic that complicated the physical encounter. Data were obtained from a random sample of both countries over the internet.

This analysis showed that the test model clarified the disparity in citizens' intention to utilize e-government services. Interestingly, however, the results found that people's desire to use e-government services is more affected by their perceptions of its effect on their efficiency and ease of using the system and less by social impact. This result also indicates that system trust merits further consideration in e-government adoption research due to its major impact on user intentions, and the two countries should focus on building trust in the system by enhancing system security and privacy.

Moreover, the findings also revealed that success performance and Effort expectations positively affected people's attitude to using e-government facilities in both countries. And finally, the results showed that e-government trust was indeed a powerful predictor of citizens' adoption. Furthermore, the results revealed that although facilitating conditions did not influence adoption in Jordan, on the other hand facilitating conditions had a substantial positive effect on the adoption of e-government in Hungary.

4.2. Scientific Contribution

Many contributions are formed with existing research; the most significant ones are:

- 1) In the research the model (UTAUT2) was tested and validated in new environment, the public sector, and a non-commercial system such as e-government.

- 2) Explored the main factors affect the e-government acceptance in Jordan (performance expectancy, effort expectancy, and trust in the system) and in Hungary (performance expectancy, facilitating conditions, and trust in the system).
- 3) The model was applied in two different countries and the results were similar in many factors such as performance expectancy and trust in system.
- 4) The new model for the two countries emphasized that trust in the system is an important and fundamental factor for accepting the e-government system.
- 5) Create a new theoretical framework suitable for both countries that can be used in other similar countries. And this study can be referred to as a reference for researchers in the two countries (Jordan and Hungary) to build more on these results.

4.3. Recommendations

Practical effects

One of the study concerns is how the results of this research might assist Jordan, Hungary, and other countries in preparing and growing e-government adoption rates with similar circumstances. This study offers a realistic and communicable checklist of social and technical considerations to e-government officials and decision-makers and covering people's viewpoints about e-government. This checklist is the foundation of every e-government initiative.

Because Jordan and Hungary face low-level citizens' adoption of e-government services, research findings are anticipated to assist e-government officials and policymakers from Jordan and every other country with similar characteristics in better positioning their policies to facilitate quicker and more effective adoption of such services.

The citizens' survey found that trust in the system itself and effort expectation contributes significantly to citizen acceptance of e-government services in Jordan. On the other hand, in Hungary, Performance expectancy, facilitating conditions, and trust in the system lead significantly to the adoption of e-government services by people.

This study's findings indicated that e-government officials in both countries should pay attention to the trust dimensions. For example, increasing system security, privacy, and other considerations influences citizens' trust in the system.

Government departments can, therefore, provide easy-to-use services. Carter and Belenger (2005) proposed various approaches to maximize planned commitment. One is to include free guides on e-government platforms to explain how people should use and interact with these programs. Government agencies can also develop their websites' support and search facilities to locate relevant details easily. Moreover, citizens' input on e-government platforms can be elicited and evaluated. This will allow

government departments to update their websites to display e-government resources and details in an easy-to-use manner for people.

Moreover, considering the performance expectancy, government departments in both countries must integrate valuable information and resources into their websites. These organizations can also use training and marketing methods to build citizens' views regarding e-government services' effectiveness and importance. To render e-government services valuable, making these services simple to use, and trustworthy is essential.

Furthermore, trust has a huge effect on citizens' views in both nations. Therefore, government departments can improve trust in the system by implementing and strategically sharing their information protection policies on government websites.

4.4. Limitations and Future Research

The shortcomings of this study can be outlined in:

- This research took cross-sectional architecture. This cross-sectional analysis reflects a slice of time, not showing how the resident's attitude and actions will change over time. Further analysis utilizing a longitudinal design will assess whether the mindset towards using e-government facilities has shifted over time.
- This research could not distribute the questionnaire evenly between the geographical regions in the country due to the Coronavirus pandemic that prompted the researcher to use the electronic questionnaire.
- The existence of many factors affects acceptance, and therefore the current study could not focus more on important factors and study them more deeply, such as (trust) related to other factors such as security and privacy.

Given these limits, this report provides useful insights into researching e-government citizenship. This study's known shortcomings contributed to recommendations for more studies.

Future research

This thesis is just one episode in a research chain. One potential path for future research is refining adoption and strengthening its calculation by introducing a semantic differential scale. Moreover, as stated, the current analysis used a cross-sectional approach. It would be useful to perform a longitudinal study and see whether the variables and their relationships remain stable over time. In addition, The Coronavirus pandemic has affected the questionnaire distribution process, as we mentioned earlier, and therefore conducting research that distributes the questionnaire equally in all geographical areas in the country will contribute to a deeper understanding of citizens' acceptance of electronic services.

The researcher studied the effect of trust in the system on acceptance, and it had a strong impact on the two countries. Accordingly, studying more variables related to trust in the system, such as (security, privacy, and transparency) may lead to a greater understanding of this variable.

Finally, this study's findings are assumed to assist Jordan, Hungary, and other countries with similar e-government and resident acceptance characteristics. More comparative research between different countries with different cultures and economies will be worth comparing this study's results with other developed countries. By performing a related analysis on various countries that could share basic characteristics with Jordan, the conclusions reached may be correlated with this study's results and validated or expanded.

5. MAIN CONCLUSIONS AND NOVEL FINDINGS OF THE DISSERTATION

Conclusion

This study reports empirical research on citizen adoption of e-government services in Jordan and Hungary. It is inspired by the low-level individual acceptance of e-government systems in developing countries. E-government systems cannot boost public service quality until the public uses them. Therefore, this study's key goal is to achieve a deeper understanding of factors affecting the use of e-government services by people. Identifying those variables can increase the probability of growing the acceptance of these programs by deepening awareness of factors that promote or impede the adoption process. The second goal for this analysis is the limited longitudinal e-government implementation studies focused on adopting such services in developing countries like Jordan. Filling this void in literature is also one reason for undertaking this research in a country like Jordan, and compare it to Hungary, which has the same population number and the same size with different cultural and social values.

After the comprehensive literature analysis, this dissertation established a theoretical model, this model combines UTAUT2 with other variables collection of infrastructure and trust. An internet survey was used to empirically validate the proposed model due to the coronavirus pandemic that complicated the physical encounter, so the data were obtained from a random sample of both countries over the internet. After the pilot the researcher excluded a number of vague or unclear questions from the questionnaire, and the researcher also combined some variables and created one theoretical framework contains seven common variables between the two countries, for conducting the final study and making a comparison between the two countries

This analysis showed that the test model clarified the disparity in citizens' intention to utilize e-government services. Interestingly, however, the results found that people's desire to use e-government services is more affected by their perceptions of its effect on their efficiency and ease of using the system and less by social impact. This result also indicates that system trust merits further consideration in e-government adoption research due to its major impact on user intentions, and the two countries should focus on building trust in the system by enhancing system security and privacy.

Moreover, the findings also revealed that success performance and Effort expectations positively affected people's attitude to using e-government facilities in both countries. And finally, the results showed that e-government trust was indeed a powerful predictor of citizens' adoption. Furthermore, the results revealed that although facilitating conditions did not influence adoption in Jordan, on the other hand facilitating conditions had a substantial positive effect on the adoption of e-government in Hungary.

New Results

- In the research the model (UTAUT2) was tested and validated in new environment, the public sector, and a non-commercial system such as e-government.
- Explored the main factors affect the e-government acceptance in Jordan (performance expectancy, effort expectancy, and trust in the system) and in Hungary (performance expectancy, facilitating conditions, and trust in the system).
- The model was applied in two different countries and the results were similar in many factors such as performance expectancy and trust in system.
- The new model for the two countries emphasized that trust in the system is an important and fundamental factor for accepting the e-government system.
- Create a new theoretical model suitable for both countries that can be used in other similar countries. And this study can be referred to as a reference for researchers in the two countries (Jordan and Hungary) to build more on these results.

6. SUMMARY

The world and the countries, in general, are moving to change the form of government and public sector management from the traditional form that relies on providing services in-person to use the technology and employ it to provide various government services and communicate with citizens and companies completely electronically.

Most of the countries in the world began to implement e-government and move from the traditional form of service provision to the electronic form since the beginning of the 21st century. With the entry of the current year, the importance of e-government has increased dramatically due to the spread of the Coronavirus pandemic in the world and the urgent need to reduce any personal contact between people. Despite these major changes, e-government programs in many countries failed for many reasons, and the most important reason was the lack of acceptance for this system by the stockholders, so the rate of acceptance and use was one of the challenges troubling officials in the public sector.

Previous studies have developed many theories and models to explore the most important factors that affect the acceptance and adoption of new technological systems such as e-government. However, these theories were often tested in developed countries and to a limited extent and less in developing countries such as Jordan. One of the most important and best models is the UTAUT model, which brings together many previous models and explains the acceptance of technology greatly compared to previous models. However, this model is still tested in different environments and does not cover all the factors that may affect the users' decision to adopt a new system, especially in the public sector.

In this research, the model was expanded with additional variables related to trust and some features of the system that were not present in the original model and may be influential in the two countries (Jordan and Hungary) to study and explore the most important factors that affect the users' decision to adopt the e-government system.

The results showed similar results in the two countries, so factors such as trust in the system and performance expectancy are important and directly influence the users' adoption of e-government services in both countries. On the other hand, the differences came in the infrastructure axis, facilitating conditions influential in Hungary and less important and effective in Jordan. Moreover, the results showed that the factor effort expectancy is important and directly influencing the adoption of services in Hungary, but less important and influential in Jordan. Finally, the effect of the mediating variable in the study was variable, as the results showed that experience plays an important role. The relationship has changed in a positive way between the two variables performance expectancy and the user's adoption in Hungary. However, in Jordan, this effect is limited to the relationship between effort expectancy and adoption; these differences in results were due to differences in the culture and level of awareness between the population of the two countries and other variables that could be discovered in the future studies to expand this study.

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8. LIST OF PUBLICATIONS



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Registry number: DEENK//2021.PL
Subject: PhD Publication List

Candidate: Nemer Mohammad Abdelhameed Aburumman
Doctoral School: Károly Ihrig Doctoral School of Management and Business
MTMT ID: 10066403

List of publications related to the dissertation

Articles, studies (5)

1. **Aburumman, N. M. A.**: Extracting the factors that affecting the hungarian citizens' adoption of e-government services from the viewpoint of university students: extended UTAUT2 model.
Cross-Cultural Management Journal. 23, 131-144, 2021. ISSN: 2286-0452.
2. **Aburumman, N. M. A.**, Fraij, J. K. I., Szilágyi, R.: Digitalization: The use of Blockchain in public sector.
Oradea Journal of Business and Economics. 5 (2), 72-82, 2020. ISSN: 2501-1596.
DOI: <http://dx.doi.org/10.47535/1991ojbe113>
3. **Aburumman, N. M. A.**, Szilágyi, R.: Factors Affecting Acceptance of Government: Using Extended UTAUT2.
Journal of EcoAgriTourism. 16 (1), 62-69, 2020. ISSN: 1844-8577.
4. **Aburumman, N. M. A.**, Szilágyi, R.: The role of social media in e-Government: systematic literature review and case of Jordan.
Central and Eastern European eDem and eGov Days. 338, 363-379, 2020. ISSN: 2520-3401.
DOI: <http://dx.doi.org/10.24989/ocg.338.29>
5. **Aburumman, N. M. A.**, Szilágyi, R.: Overview of the electronic public services in agriculture in Jordan.
Journal of Agricultural Informatics. 9 (2), 40-53, 2018. ISSN: 2061-862X.
DOI: <http://dx.doi.org/10.17700/jai.2018.9.2.433>



List of other publications

Articles, studies (5)

6. Fraij, J. K. I., **Aburumman, N. M. A.**: How Does Telework Act As A Solution To The Public Sector In The Time Of Pandemic?
Network Intelligence Studies. 9 (17), 13-24, 2021. EISSN: 2344-1712.
7. Fraij, J. K. I., Haddad, H., **Aburumman, N. M. A.**: The Quality of Accounting Information System, Firm Size, Sector Type as a Case Study from Jordan.
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8. Fraij, J. K. I., Aldabbas, A. K. A. E., **Aburumman, N. M. A.**: Blockchain as an e-voting tool.
International Journal of Advanced Research. 8 (12), 858-866, 2020. EISSN: 2320-5407.
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9. Oláh, J., **Aburumman, N. M. A.**, Popp, J., Khan, A. M., Haddad, H., Kitukutha, N. M.: Impact of Industry 4.0 on environmental sustainability.
Sustainability. 12 (1), 2020. ISSN: 2071-1050.
DOI: <http://dx.doi.org/10.3390/su12114674>
IF: 3.251
10. **Aburumman, N. M. A.**, Nieto, A.: The effect of products attributes customer satisfaction on brand loyalty in the electronic appliances industry: case of Jordan.
Oradea Journal of Business and Economics. 4 (Spec.), 39-51, 2019. ISSN: 2501-1596.
DOI: <http://dx.doi.org/10.47535/1991ojbe066>

Total IF of journals (all publications): 3,251

Total IF of journals (publications related to the dissertation): 0

The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of the Journal Citation Report (Impact Factor) database.

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