

Factors Affecting Egyptians Adoption of E-government Using Extension of the UTAUT Model after COVID-19 Pandemic

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Abstract- In this era, e-government has transformed the interaction between the government and the citizens. Egypt is a developing country that has recently experienced a transition to e-government. The COVID-19 pandemic has and still deeply changed the world. This study examines the efficiency and the acceptance of e-government factors in Egypt. A proposed model was developed by reviewing the key concepts related to the implementation of the e-government and testing the pandemic influence to accelerate the acceptance and the real usage. Citizen trust in government and technology is urgent to the widespread adoption of e-government. Thus, the Unified Theory of Acceptance and Use of Technology model (UTAUT) has been extended by including government trust and Internet trust. The study was conducted by surveying the opinions of 483 citizens. The results shed a light on the key factors of e-government adoption in Egypt and support the proposed constructs; performance expectancy, effort expectancy, social influence, facilitating conditions, trust in the government, and trust in the Internet, in addition to the role of education and income as indirect moderators' factors. Moreover, most of the participants were satisfied with e-government services as a good and useful channel to get governmental information and services during the pandemic.

Index Terms- E-government, Egypt, Trust, PLS-SEM, UTAUT

I. INTRODUCTION

According to the World Bank e-government has defined as “government-owned or operated systems of information and communications technologies (ICTs) that transform relations with citizens, the private sector and/or other government agencies to promote citizen empowerment, improve service delivery, strengthen accountability, increase transparency, or improve government efficiency” [1]

Usually, the interaction between a citizen or business and a government agency occurs in a government office. In the past, government organizations paid little attention to service quality or responsiveness to users. With emerging ICTs and the approach of e-government, today in developed countries, e-government is allowing to delivering of government services directly to citizens in their homes, using the web to buy necessary products and services in a more timely and cost-effective way, conducting virtual town hall meetings to allow representatives to communicate with their electorates, using large national networks to link organizations and share information, using electronic polling and voting and creating intergovernmental networks to coordinate global issues. Developing countries have begun to recognize the emergence of e-government as a potential to reshape the public sector and build relationships between citizens and the government. [2], [3], [4]

E-government not only provides advantages such as inexpensive and reliable services to citizens and businesses, through using all internal and external services online means decreases the processing costs of many activities as well as will increase the government efficiency, but also offers the possibility to reshape the public sector and remark the relationships between citizen, and the government by allowing for open-communication, participation and public information flow in preparing national regulations since e-government is looking for to create an atmosphere of interaction between all partners in e-government through the exchange of information on a network and an integrated and harmonious community [5], [6]

Egypt has taken an e-government initiative since 1999, as part of its plan to turn Egypt into an information-based society. In 2001, The Egyptian e-government program in Egypt began within the Ministry of Communication and Information Technology (MCIT) and was

a component of the Egyptian Information Society Initiative (EISI), Egypt Information and Communication Technology (ICT) strategy. In 2004, the program was moved to the Ministry of State for Administrative Development (MSAD), as a part of administrative improvement and development, together with the institutional reform of public administration. In January 2004 the Egyptian Prime Minister and Microsoft Chairman Bill Gates started the e-government solution using Microsoft technology. The government of Egypt installed an e-government portal (www.egypt.gov.eg) in January 2004. Some services were placed in the portal to trail test the project as telephone e-billing, birth certificate, issuing, etc. [7] [8] [9] [10] [11], [6]

The e-government portal delivers content in both Arabic and English to offer services for individuals, businesses, and foreigners. The website introduces an e-payment facility and the availability to download the necessary documents for achieving government services, which include digital assets repository, land transportation services, traffic attorney and vehicle licenses services, as well as online services for businesses such as environmental services and qualified Industrial zone services. Moreover, the e-government offers online services such as Egypt airline ticketing services and cultural services [9] [11]

Egypt has made several works to improve its e-government in the last few years. In terms of success in communication infrastructures, connectivity and access have been developed by implementing several policy measures, including the deregulation of the telecommunication sector with the launching of four mobile operators' licenses. In addition, high-quality broadband connections are accessible in main cities and business parks, such as the Smart Village. [5]. But the UN e-government survey (2020) Egypt is ranked number 111 worldwide. Table 1 shows E-Government Development Index rank from 2004 to 2020. According to this index rank, it is easy to notice the fluctuates up and down. This ranking might be attributed to many obstacles to implementing an e-government program in Egypt. In addition, developing countries are less advanced than developed countries in the areas of technological infrastructure, maybe because the technology is produced in the developed countries, but the developing countries import it. The ability to develop countries to obtain the full advantages of e-government is limited and is mainly restricted by the existence of a combination of political, legal, social, and economic barriers [5]

Table 1: Egypt E-Government Development Index rank

Egypt	2020	2018	2016	2014	2012	2010	2008	2005	2004
E-Government Development Index rank	111	114	108	80	107	86	79	99	136

COVID-19 had great effects globally. All countries have acted quickly and taken quick protective actions to slow the spread of the virus. Egypt's e-government takes jumped in 2020, from EGP 1billion to EGP 4billion per month following the occurrence of the COVID-19 pandemic. The significant jump reflected an annual growth of 250%, stress strength of the country's electronic payment (e-payment) and collection system, according to Minister of Finance Mohamed Maait, Maait said that the administrative regulations of the law concerning non-cash payment methods have contributed to placing order the foundations for the transformation of payment methods and electronic collection. This change has been observed not only in administrative organizations but also spreads to the public and private sectors.

The minister mentioned the deadline for organizations addressed by this law is 7 March 2021, with organizations also being subject to its administrative regulations to resolve their situations. They will also be resolved to provide means of non-cash payment for those dealing with vents for the collection of services at no extra cost.

The minister added that, in collaboration with the banking sector, the payment of government fees has been made possible through money collection machines at administrative organizations, through the quick response code (QR CODE) of mobile wallets, which is an easy and safer service of carrying out payments during the global health pandemic, as there is not any need to use any bank cards to pay government fees.

In addition, the minister added that about 37,000 Meeza cards were issued during the first and second trial stages and that the ministry is running against time to finish operating about 5 million Meeza cards in the future period. [12]

According to the 2030 Agenda for Sustainable Development, the presence of e-governments or e-governments is no longer just a step that governments can take. Rather, it has become a necessity and a measure of governance over the progress of any government and its achievement of sustainable development goals.

But effective e-government is depending on understanding how citizens accept technology. Thus, the main objective of this study is to explore the factors that affect citizens' acceptance of e-government in Egypt, especially after the COVID-19 pandemic which accelerate and encourage more people to use many online services. The study investigates the factors that influence Egyptian citizens to accept and use e-government by applying an extension UTAUT Model. In addition, the study put attention on building people's trust and

extends the model by including government trust and Internet trust

Research Questions

- What are the citizen's opinions of e-government services as a solution to keep governments and citizens connected during the outbreak either through information sharing or online services?
- What are the most e-government services used by the citizens?
- What are the main sources of knowledge of e-government services?

In addition, to answer the previous questions, the conceptual framework of UTAUT was proposed as the foundation for this study to investigate the factors of e-government acceptance.

After the introduction, section 2 briefly discusses the literature review for the conceptual model and e-government studies. Section 3 presents the methodology and the hypotheses. Section 4 includes sampling, data collection, analysis, and hypothesis testing. Section 5 is discussed the findings in detail. Finally, Section 6 concludes the research and future research

II. LITERATURE REVIEW

a. *The Unified Theory of Acceptance and Use of Technology (UTAUT)*

UTAUT is one of the modern developments in the field of general technology acceptance models. It aims to justify user intentions to use an information system and the additional usage behavior. Venkatesh et al. (2003) created this combined model to present a more understanding of the acceptance process than any previous models had been able to do. The UTAUT considers the four main key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions), which are direct predictors of usage intention and behavior. In addition, gender, age, experience, and voluntariness of use are suggested to mediate the impact of the four key constructs on usage intention and behavior [13]

1. Performance expectancy (PE): "is the degree to which an individual believes that using the system will help him or her to attain gains in job performance."
2. Effort expectancy (EE): "is the degree of ease associated with the use of the system."
3. Social influence (SI): "is the degree to which an individual perceives that important other believe he or she should use the new system."
4. Facilitating conditions (FC): "is the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system."

UTAUT2 suggests that, in addition to the UTAUT constructs, the intention to use the technology is influenced by hedonic motivation (i.e., the degree to which the technology is perceived to be enjoyable), price value (i.e., the cognitive trade-off between perceived benefits and financial costs of technology usage) and habit (i.e., defined as the passageway of time from the initial technology usage). In addition, voluntariness as a moderator variable was excluded [14]

b. *Technology Acceptance in E-government*

Many studies have used technology acceptance models to test e-government services. For example, Hung et al. (2006) used the TPB model to investigate factors that influence the public to use online tax filing and payment systems in Taiwan [15]. Gupta et al. (2008) used UTAUT to investigate the adoption behavior of employees towards using the Internet as an internal communication channel at an organization in India [16]. Lean (2009) used integration constructs from the models of TAM and DOI to investigate factors influencing the intention to use e-government services among citizens in Malaysia [17]. Shareef et al. (2011) used a combination between TAM, DOI, and TPB to discover the critical factors that enable citizens to adopt e-government at different stages of service in Canada [18]. Lin et al. (2011) used TAM to explain and predict users' acceptance of corporate information technology in the Gambia [19]. Al-hujran et al. (2013) used TAM to investigate citizen adoption of e-government services in Jordan. [4]. Alshehri et al. (2013) used UTAUT to explore the key factors of Saudi citizens' acceptance of e-government [20]. Ahmed & Mansoori (2017) used a modified UTAUT model to investigate Emirati citizens' adoption of e-government in Abu Dhabi [21]. Amrouni et al. (2019) tried to identify and predict the

factors that influence an employee to adopt technology implemented at the workplace by focusing on using UTAUT and TTF theory [22]. Jacob and Darmawan (2019) used the extension of UTAUT to understand the citizens' acceptance and use of e-government in developing countries [23]. Maznorbalia & Awalluddin (2020) used UTAUT to investigate the key factors of Malaysian citizens' in Sintok, Kedah, a semi-rural area on acceptance of e-government services [24]. Mutaqin and Sutoyo (2020) used UTAUT to investigate factors that influence the use of e-punten applications in the city of Bandung [25]. The results differed from one study to another according to the countries, developed or developing, and according to the hypotheses and the extensions of the model. But most of these studies investigated e-government implementation using the factors of DOI, TAM, UTAUT, and TPB and showed that performance expectancy, effort expectancy, and facilitating conditions had a significant positive effect on behavioral intention to use e-government services. However, social influence did not have a significant influence on behavioral intention in all studies. Moreover, trust as an additional construct has shown to have a significant positive impact on e-government services in many studies [15], [17], and [18]. Also, the price value as a proposed construct at UTATU2 has shown to have a significant positive impact on e-government services [26].

Regarding Egypt, some studies on e-government acceptance focused on the challenges of the e-government in Egypt and provided solutions to these challenges. These challenges can be summarized as; the Lack of e-signature systems, security, and private affairs, e-payment transactions challenges especially for simple citizens, computer illiteracy, lack of citizens' awareness, participation, and education, and lack of integration and information sharing between governmental agencies, The absence of unified standards and the connection among service providers [10]. Some recommendation for acceptance of e-government in Egypt were; reviewing technical and governmental experiences of other countries in order to use their experience in the field of implementing the e-government, Egypt e-government portal should be separate e-payment system connected to all channels of the Egypt banks to handle all online transactions, government should work in close cooperation with the private sector and citizens for confirming secure use of e-government portal, develop applications outfits citizens' wants and features, including simple and suitable payment methods, e-government services should often be reviewed to ensure that these services are workable, execution and accessible, extend e-service access, free or low price for the Internet which can help in solving e-service access problems, high consideration should be given to the delivery of services and content development using mobile platforms, deliver free executive training courses to help citizens access and deliver some basic educational resources on e-government at the school level [8], [10] and [6].

The existing literature on the impact of COVID-19 in the government sector is mostly illustrative and focused on measuring national governments' competence in managing their citizens' state of affairs, for example [27], [28], and [29]

III. METHODOLOGY

A modification of the UTAUT model is proposed in this study, where variables have been added to the original UTAUT model related to trust, e-government trust, and Internet trust. Trust in government according to the literature was an important construct as mentioned before. In addition, price value was added as proposed in UTAUT2.

Then the proposed model includes the dependent variables; behavioral intention and perceived use of e-government, the independent variables; performance expectancy, effort expectancy, social influence, price value, facilitating conditions, e-government trust, and Internet trust, besides five moderating variables; the three traditional (age, gender, and experience), in addition, education level and income level as additional moderators, that are expected will influence the independent variables.

Trust is an integral part of e-government adoption, a citizen wants to be sure in making transactions through e-government services that his private information is secured. In addition, trust in the Internet is critical when the information that is shared with others is sensitive [3] [30], [21] and [31]

Education and income level are not included in the original UTATU or the extended UTAUT2. But they have been added because they have been found by many researchers, such as [32], [33], [34], and [31] that education level has been noted as an important moderator in technology acceptance because highly educated people tend to adopt new technologies more [35], and higher income are more likely to be confident in their ability to understand how government runs and to get involved effectively [36].

The following Figure 1 illustrates the proposed UTAUT

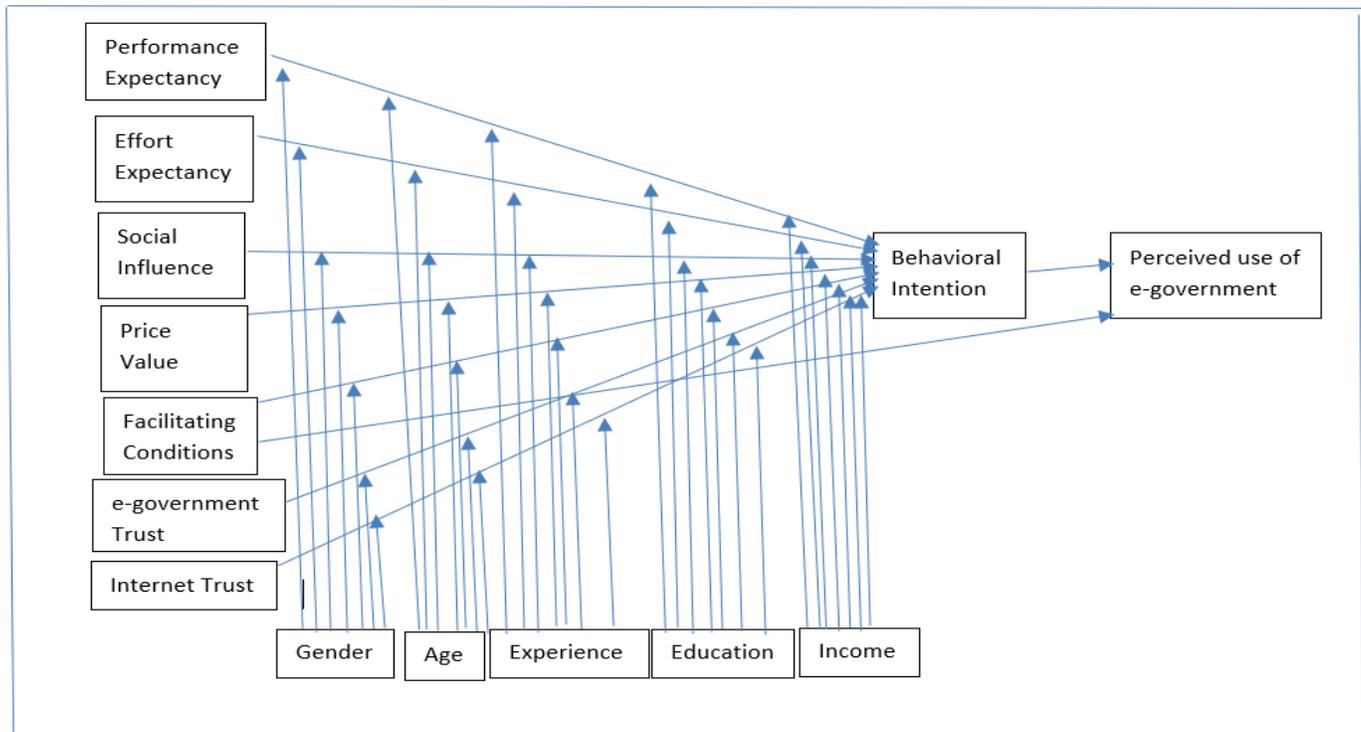


Figure 1: The modified diagram of UTAUT hypotheses

The research hypotheses are the following:

- H1: Performance expectancy will have a positive influence on behavioral intention to use e-government services.
- H2: Effort expectancy will have a positive influence on behavioral intention to use e-government services.
- H3: Social influence will have a positive influence on behavioral intention to use e-government services.
- H4: Price value will have a positive influence on behavioral intention to use e-government services.
- H5: Facilitating conditions will have a positive influence on behavioral intention to use e-government services.
- H6: Facilitating conditions will have a positive influence on the perceived use of e-government services.
- H7: Trust in the e-government will have a positive influence on behavioral intention.
- H8: Trust on the Internet will have a positive influence on behavioral intention.
- H9: Behavioral intention to use e-government services will have a positive influence on the perceived use of e-government.

In addition, gender, age, experience, education, and income moderate hypotheses H1, H2, H3, H4, H5, H7 and H8

The proposed UTAUT applied the partial least squares method of structural equation modeling (PLS-SEM). PLS is a technique that reduces the predictors to a smaller set of uncorrelated components and performs least squares regression on these components, instead of on the original data. SEM is a powerful multivariate analysis technique that is widely used in the social sciences. It is a group of statistical techniques used to measure and analyze the relationships between observed and latent variables. Like but more powerful than regression analyses, it tests linear causal relationships among variables, while simultaneously accounting for measurement error [37], [38]. SEM technique is a statistical methodology to evaluate the relationships in the UTAUT model and to test the hypotheses among the variables in the model [39]

Based on the key aim of the study, i.e., to investigate the factors affecting the Egyptian citizens' adoption of e-government services, a quantitative approach was assumed, using an online questionnaires survey. The SPSS program was used for the statistical analysis, and the SmartPLS3 program was used for the reliable analysis and testing of hypotheses. The questionnaire was divided into two parts, the first part was about demographic information and the second part contained statements covering the 9 hypotheses of the proposed UTAUT model where a Likert scale was used to test the model (from Strongly Agree to Strongly Disagree). The structured questionnaire was developed using Google form through the social network site Facebook. Pre-testing was conducted to ensure the clarity and understandability of the survey. The responses were 483 citizens

The sufficiency of the sample is measured by Kaiser Meyer Olkin (KMO) in SPSS. The sampling is adequate or sufficient if the value of KMO is larger than 0.5 [40]

The results section should provide details of all of the experiments that are required to support the conclusions of the paper. There is no specific word limit for this section. The section may be divided into

subsections, each with a concise subheading. The results section should be written in the past tense.

IV. DATA ANALYSIS AND RESULTS

Statistical Packages for Social Science (SPSS) was used to analyse the data collected through the surveys. The SmartPLS3 program was used for the reliable analysis and testing of hypotheses. It depends on PLS-SEM.

According to the collected data, the KMO value is 0.767, which means the sample size was adequate.

- a. *Descriptive Statistical Perspective*
 - i. *Demographic information*

The following Table 2 provides a general overview of the Egyptian citizens who participated in this study in terms of demographic information, such as age, gender, and education level.

Table 2. Demographic information of respondents

Item		Percentage
Age	< 25	43.7
	26 to 45	33.7
	> 46	22.6
Gender	Male	46
	Female	54
Educational Level	Diploma or less	14
	Higher education Student	33
	Bachelor degree	42
	Postgraduate degree	11.2
Approximately, family monthly income	Less than 3000	21.3
	3001 to 10000	51.8
	10001 to 20000	16.8
	More than 20000	10.2
Place of live	Capital Cairo	69.8
	Delta governorates	20.2
	Upper Egypt governorates	10

According to the data, the largest group of participants were aged less than 25 (43.7 %), followed by those middle-aged 26-45 (33.7 %), then greater than 46 (22.6 %).

The number of female respondents was comparable to the number of male respondents; female participants (54%) and male participants (46%).

The largest group of participants (42%) had a Bachelor of Education degree qualification, followed by higher education students (33%) then a diploma or less (14%), and the smallest group had a postgraduate degree (11%).

The distribution of the respondents by income was categorized into four groups: 21.3% with income less than 3000 EGP, 51.8% had

income in the range of 3,000 to 10,000 EGP, 16.8% with income in the roof ge 10,000 to 20,000 EGP, and 10.2% with income more than 20,000 EGP.

69.8% of the participants were from Cairo city, 22.2% were from Delta governorates, and 10% were from Upper Egypt governorates.

In addition, 83% of the respondents had used e-government services and confirmed that it was a useful channel for communicating with the government during the pandemic, 17% have not used it. The high usage of e-government services was explained by the fact that most of the respondents were from Cairo, higher education students, or had a university degree

ii. E-government Usage details

The e-government portal offers content in both Arabic and English to deliver services to citizens, businesses, and foreigners. Table 3 shows the services provided by the portal and the percentages of usage of these services from the participants.

Table 3: E-government portal services

E-government services on the Egyptian Portal	Percentages
Documentation services for citizens ((Birth document - death certificate)	30
Documentation services for citizens (marriage document - divorce document - family registration)	10
Documentation services for citizens (purchase of a national number form - national number card)	36
Documentation services for citizens (elderly service - people with special needs)	2.5
Inquiry services / reading registration / bill payment (water - telephones - electricity - gas)	51.5
Student Services (University Admission Coordination Office - University Dorms Admission Coordination Office - Degree Equivalency Services)	68.4
Municipal services (replacement of lost/building permits - request to inspect a property that is deteriorating - complaint - advertising license - works permit - payment certificate)	10
Services for Egyptians abroad (request for the issuance of an official extract of the birth certificate - application for renewal of work permit - filing a complaint or a general request - preserving the citizen's right to registration - extraction and renewal of passports and nationality affairs - civil and personal status - all kinds of attestations - entry visas - application for renewal of the travel document for the Palestinians	8.5
Government job search services and registration of job seekers – manpower	11.4
Inquiry services for EgyptAir flights	30
Train schedule services - train reservations	27
Traffic Prosecutions Services (Violations Inquiry)	25.6

The electronic university admission coordination started in 2004 in Egypt, so the higher percentage of the e-government services usage (68.4%) was for student services. Most of the participants used the inquiry services for reading registration or bill payment (51.5 %). 36 % of the participants used the e-government to get national number services. The birth document, death certificate, and inquiry services for EgyptAir flights were used by 30%. More than a quarter of the participants also used train and traffic services (27 %, 25.6 %). Low percentages of usage were for a government job (11.4), family services and municipal services (10%), and Egyptian abroad services (8.5%). The fewer services used were for the elderly and people with special needs (2.5% only)

Table 4 shows the main sources of knowledge about e-government services. The most common source was from family and friends (39%). Then from the social network sites (34.6%). TV ads helped 23% to know about e-government services. Only 18.4% of the participants searched on the Internet by themselves to know about the e-government services available.

Table 4: Sources of knowledge of e-government services

Family and friends	39
Social networks sites	34.6
TV ads	23
From the Internet	18.4

b. Reliability Verification

To calculate the measurement model features of the nine reflective hypotheses, the researcher executed the tests suggested by [38]

The reliability of a measure refers to the degree to which the instrument is free of random error. It is concerned with the consistency and stability of the measurement. Cronbach-alpha was used as a measure of the internal consistency of each of the variables constructed from the survey. Cronbach's alpha values higher than 0.6 are considered reliable. According to the following table, Table 5 the result

shows that all alpha values of the study instrument were reliable and exhibited appropriate construct reliability.

Table 5. Cronbach alpha reliability results

Construct	Cronbach's alpha
	> 0.6
Performance Expectancy	0.892
Effort Expectancy	0.915
Social Influence	0.880
Price Value	0.651
Facilitating Conditions	0.801
Trust E-Government	0.837
Trust in Internet	0.839
Behavioral Intention	0.940

c. Validity Test

Construct validity is the degree to which an operational measure correlates with the theoretical construct examined. In this study, confirmatory factor analysis was conducted to measure the overall measurement models and examine the convergent and discriminant validity.

i. Convergent Validity

Convergent validity is the degree to which a measure correlates positively with alternative measures of the same construct. The items that are measures of a specific reflective construct should converge or share a high proportion of variance. To evaluate the convergent validity of reflective constructs, researchers consider the outer loadings of the indicators and the average variance extracted (AVE) [38]. Loadings above 0.70 indicate that the construct explains more than 50% of the indicator's variance, demonstrating that the indicator exhibits a satisfactory degree of reliability, the size of the outer loading is also usually called indicator reliability. An acceptable threshold for the AVE is 0.50 or higher. For the composite reliability criterion, higher values indicate higher levels of reliability. Results between 0.70 and 0.95 represent "satisfactory to good" reliability levels. Table 6 shows the composite reliability, AVE, and the indicators' reliability for all the constructs.

Table 6: Convergent Validity

Construct	Composite Reliability	AVE	Items	Indicators' Reliability
	>0.7	>0.5		>=0.7
Performance Expectancy	0.925	0.756	PE1	0.896
			PE2	0.865
			PE3	0.842
			PE4	0.874
Effort Expectancy	0.940	0.797	EE1	0.862
			EE2	0.895
			EE3	0.911
			EE4	0.903
Social Influence	0.943	0.893	SI1	0.943
			SI2	0.947
Price Value	0.809	0.586	PV1	0.811
			PV2	0.728
			PV3	0.756
Facilitating Conditions	0.883	0.716	FC1	0.866
			FC2	0.873
			FC3	0.798
Trust E-Government	0.888	0.665	TGOV1	0.745
			TGOV2	0.787
			TGOV3	0.849
			TGOV4	0.876
Trust in Internet	0.893	0.676	TNET1	0.822
			TNET2	0.871
			TNET3	0.844
			TNET4	0.747
Behavioral Intention	0.962	0.893	BI1	0.940
			BI2	0.954
			BI3	0.942

ii. Discriminant Validity

Discriminant validity is the range to which scales show their suggested construct differently from the relation with all other scales in the research model. Discriminant validity is measured by comparing the square roots of AVE to the inter-factor correlations between constructs, Table 7 shows the AVE values, if the AVE is higher than the squared inter-scale correlations of the construct then discriminant validity is supported.

Table 7: Discriminant Validity

	PE	EE	SI	PV	FC	TGOV	TNET	BI
PE	0.869							
EE	0.691	0.893						
SI	0.526	0.450	0.945					
PV	0.645	0.552	0.473	0.766				
FC	0.676	0.752	0.467	0.609	0.846			
TGOV	0.542	0.507	0.427	0.531	0.479	0.816		
TNET	0.561	0.534	0.482	0.524	0.529	0.691	0.822	
BI	0.745	0.662	0.533	0.610	0.651	0.569	0.617	0.945

Figure 2 displays the Smart-PLS3 model that was proposed for the hypotheses connected with e-government

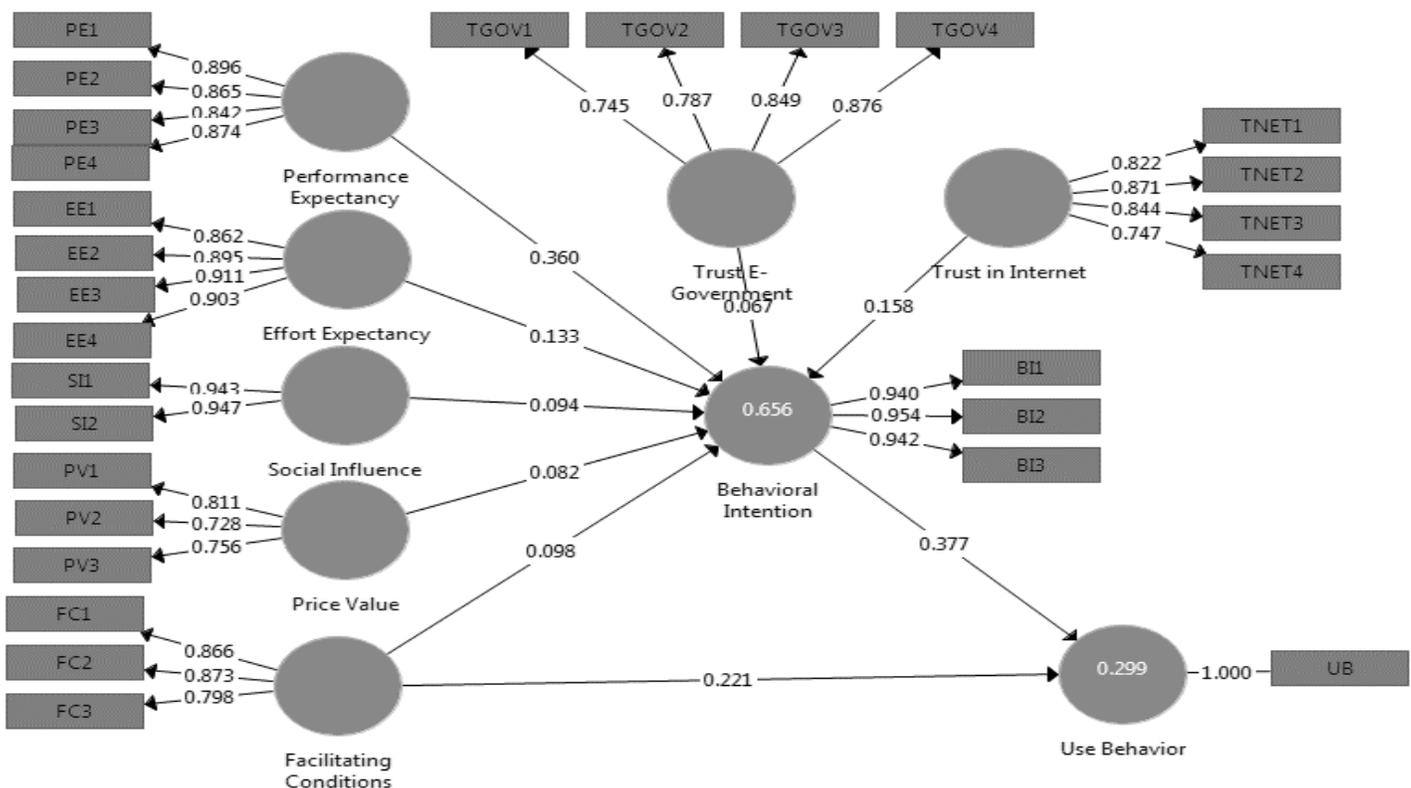


Figure 2. E-government Proposed model Results

d. Hypothesis Testing Results

Testing the hypotheses aims to determine which predictors (independent variables) provide a meaningful contribution to the description of the dependent variables. In this study, hypotheses testing was conducted using SmartPls3, bootstrapping process was used with 5000 bootstrap subsamples. Path coefficients with the significant t and p values have been considered for the evaluation of results. Table 8 represents the results supported depending on the result coefficients beta.

Table 8: Summary of Structural Model Path Coefficients

Hyp #	Path	Path Coefficient	Standard Deviation	T Statistics	P Values	Sig. Level
H1	PE -> BI	0.360	0.051	7.008	0.000	***
H2	EE -> BI	0.133	0.051	2.611	0.009	**
H3	SI -> BI	0.093	0.038	2.477	0.014	**
H4	PV -> BI	0.082	0.040	2.055	0.040	**
H5	FC -> BI	0.098	0.049	2.005	0.045	**
H6	FC -> UB	0.222	0.052	4.203	0.000	***
H7	TGOV -> BI	0.067	0.039	1.712	0.088	*
H8	TNET-> BI	0.158	0.041	3.806	0.000	***
H9	BI -> UB	0.377	0.051	7.432	0.000	***

Note: *p < 0.1; **p < 0.05; ***p < 0.01

All hypotheses of this study have been confirmed. And independent variable PE (performance expectations) had the strongest effect on the dependent variable BI (behavioral intention), ($\beta=0.360, p<0.01$). Citizens feel that using the e-government system will help them to achieve job performance efficiently. The impacts of EE, SI, PV, FC, TGOV, TNET on BI, and FC on UB has also been approved. So, the results of this study have been able to provide support for the theory of Venkatesh et al. 2003 [13], which stated that performance expectancy, effort expectancy, social influence, and facilitating conditions have significant effects on behavioral intention, and the facilitating conditions have a significant effect on the system use behavior. The intention to use significantly affect the respondent's behavior in using e-government services. In addition, the results showed that the price value had a significant effect on behavioral intention according to the extended UTATU2 [14], and agreed with the study of Munyoka 2019 [26]. Trust as an additional construct showed significant effects on behavioral intention which was confirmed by many studies [15], [17] and [18] and reflects the importance of trust factors to adopt and use e-government services. Citizens must ensure secure and private data communication over the Internet, in addition to, trust in the government agency that provides the service. The government agencies need to connect their power to provide citizens with suitable, reliable services.

e. Moderators Testing Result

Possible moderations of the variables, gender, age, experience, education, and income on the relationship of each of the independent variables with the dependent variables (BI) were examined. A variable was confirmed to be a moderator if the relationship between the dependent variable and a given independent variable changes significantly depending on the level of the moderator.

After testing, gender was confirmed to moderate the effect of three independent variables, PE (P=0.091), PV (P=0.022), and SI (P=0.015) on behavior intention. Hence, the gender difference can moderate performance expectancy, social influence, and price value on behavioral intention. The effect of performance expectancy on behavioral intention will be stronger for men, female users suggested on average to be less likely to adopt technology compared to males [41], the women tend to be more sensitive to others' opinions and therefore find social influence to be more significant when starting an intention to use new technology, the price value allocated by men to technologies will likely be higher than the value allocated by women to the same technologies, which confirm the theory of Venkatesh et al. 2013 [14].

Age was confirmed to moderate only the effect of SI (P=0.087). Hence, the age difference can moderate social influence on behavioral intention. This supports Venkatesh et al.'s 2003 theory that older persons have more social influences.

The experience was confirmed to moderate the effect of three independent variables, EE (P=0.027), TGOV (P=0.070), and TNET (P=0.073). Hence, the difference in experience can moderate effort expectancy, e-government trust, and Internet trust on behavioral intention. This supports Venkatesh et al.'s 2003 theory that effort expectancy will be most affected with relatively little experience with the system.

Education was confirmed to moderate the effect of PE (P=0.068). Hence, the effect of performance expectancy on behavioral intention will be stronger for highly educated people who tend to adopt new technologies more [35].

Income was confirmed to moderate the effect of four independent variables, PE (P=0.002), PV (P=0.069), TGOV (P=0.057), and TNET (P=0.084). Hence, the income level can moderate performance expectancy, price value, e-government trust, and Internet trust on behavioral intention. Higher-income are more likely to be confident in their ability to understand how government runs and to get involved in an effective way [36].

V. DISCUSSION

E-governments are nowadays paying increasing attention to efficient interactions with their citizens who have great access to electronic connectivity and interactions. The vision of the Egyptian state 2030 declares the government's intention to build a strong ICT-based infrastructure for the delivery of quality services for all sectors. Carter and Belanger (2005) contended that the success of e-government creativities is dependent not only on government support but also on citizens' enthusiasm to accept and adopt those e-government services. This study uses a modified version of the UTAUT model to explore the factors that might influence the adoption and use of e-government services in Egypt, especially after COVID-19 which helped and encouraged citizens to know and use the electronic services in all sectors. Egypt made growth in its e-government project and did notable improvements during this pandemic, from EGP 1billion to EGP 4billion per month.

According to the results, we can respond to the main questions as follows. The participants were satisfied with e-government services as a useful channel to get governmental information and services during the pandemic. The most common sources of knowledge about the e-government services were from family and friends, then from the social network sites. The most usages were student services, inquiry services for reading registration or bill payment then national number services. Although there were useful services for the elderly and people with special needs the percentages of using them are very weak.

For the hypotheses and according to the analysis of the collected data, performance expectancy had a strong positive effect on behavior intention, but there is no effect of age or experience as moderators to this relationship. Effort expectancy had a positive effect on behavior intention, but there is no effect of gender, age, or education as moderators to this relationship. Although social influence did not have a significant influence on behavioral intention in all studies, in this study it had a positive effect on behavior intention, but there is no effect of income, experience, or education as moderators to this relationship. Price value had a positive effect on behavior intention, but there is no effect of age, experience, or education as moderators to this relationship. Facilitating conditions had a significantly positive influence on both behavioral intention and use behavior but the findings indicated that there is no moderator effect. For the trust constructs, e-government trust, and Internet trust both had a positive effect on behavior intention, but there is no effect of gender, age, or education as moderators to these relationships.

VI. CONCLUSION, RECOMMENDATIONS, and FUTURE RESEARCH

The e-government development index in Egypt is still fluctuating up and down, which means that Egypt is still faced with many challenges in its activities to implement e-government initiatives effectively. But COVID-19 accelerates and encourages more citizens to use the e-government services. With more focus on issues related to security, privacy, and trust in using e-government, providing IT skills and computer or Internet programs will increase the citizen's awareness of using online services. Need more awareness about e-government services, for example, the elderly and people with special needs

This study applies the presently modified UTAUT model to user acceptance and use of e-government services in Egypt. Based on the data collected and the results of the analysis, it can be concluded that performance expectancy, effort expectancy, social influence, price value, and facilitating condition, in addition to e-government trust and Internet trust have positive influences on user intention to use e-government services. In addition to the traditional moderators, age, gender, experience, and education, income proved to be an important moderate, which influences five constructs from seven constructs.

The findings can offer useful insights to decision-makers, trust in the government agency and trust in the Internet is an essential element of e-government acceptance. Citizens must trust a secure and private data transmission process. It could be claimed that while this paper has a focused on Egypt, the key findings presented may also have significant implications for other developing countries, especially after the global effect of COVID-19. Considering the effect of the individual's income and the education level is important to understand the acceptance of e-government adoption.

This study, like any other, has its own set of limits. First, Egypt is a big country, and the number of responders may not reflect the opinions of all Egyptian citizens about the adoption of e-government services. Second, this study did not investigate citizens' satisfaction and the quality of each of the e-government services. Third, the study focused on e-government services acceptance and did not link these acceptance factors with the most important nowadays challenges

In future work, a larger study should be carried out. In addition, considering Egypt's large geographical area, it might also be important to evaluate whether there is any variation in the acceptance and use of technologies concerning the region. Adding website quality as an independent variable into our research model and considering the effects of other crucial constructs of the UTAUT model within the context of Egypt is important. Evaluating the actual application of the solutions and discovering the new challenges are important too. To be more precise and realistic, our work will continue, and new findings will be anticipated especially as we approach

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