PATH ANALYTIC INVESTIGATION OF THE INTENTION TO ADOPT E-GOVERNMENT SERVICES THROUGH MOBILE APPLICATIONS IN QATAR (TAM REVISITED)

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ABSTRACT

The aim of this research is to examine the factors that affect user's intention to use e-government services through mobile applications in Qatar. Based on valid responses from 1,340 adults out of a representative sample size of 7200 (response rate=18.6%) in Qatar aged 18 to 77 years old, this study uses factor analysis and structural equation model to identify the variables that influence users' intention to adopt mobile applications in Qatar. Findings of this study indicate that factors

affecting the intention to adopt e-government services through mobile applications are: awareness, perceived trust, perceived ease of use and perceived usefulness of mobile applications. The present study supports the hypothesis through the findings that perceived usefulness and perceived ease of use leads to mobile application of e-government adoption. The present study adds a relevant and a novel contribution to the field of technology acceptance by encompassing the TAM theory to smartphone applications. The paper concludes with recommendations for institutional policy and future research.

1. INTRODUCTION

Nowadays, more and more governments in developing countries are using information and communication technologies (ICTs) to provide secure services to their citizens. Stuti Saxena believes that "[W}ith an increasing thrust upon transparency and accountability in government, e-government platforms are being scaled in many countries to bolster trust of the citizens and to bring about efficiency in public service delivery" (Saxina, 2017; p. 628). What's more, Nada Abdelkader Benmansour notes that "Qatar has one of the fastest population growth and highest migrant population which makes the question of the satisfaction with public services unique. And, since the blockade on Qatar in May 2017 and the environment of economic restriction, the issue becomes even more critical" (Benmansour,2019; p.326). Growing advances in ICTs has led to endless awareness of smartphones that have superfluous features (Hassan et al. 2014). The rush for using smartphones has resulted in the growth and rising use of mobile applications to meet the numerous requirements of the users for various purposes (Roy, 2017). Taylor and his colleagues (2011) argue that mobile applications are "small programs that run on a mobile device and perform tasks ranging from banking to gaming and web browsing" (Taylor *et al.* 2011, p. 60). While Johnson (2010) believe that mobile apps "cut through the clutter of domain name servers and un-calibrated information sources, taking the user straight to the content he or she already values" (Johnson, 2010, p. 24). According to Accenture (2012), the world has been directed into a Mobile era in which users can have an application for everything. There are loads of benefits of using mobile applications such as time saving, improved visibility, personalized content, instant updates and interactive engagements. For this, the provision of e-government services through mobile applications (identified as m-government) has had a major progression in modern time. Thus, from a theoretical perspective, using the Technology Acceptance Model (TAM) to explain users' adoption of mobile applications for e-government services would benefit the academia and decision makers worldwide in general and in Qatar in particular.

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2. REVIEW OF LITERATURE

According to Ho(2002), E-government was found in the end of the early 1990s. Having said that and in keeping with the World Bank definition "E-Government refers to the use by government agencies of information technologies (such as wide area networks, the internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government"(World Bank, 2009). The research model used in this study is premised on Davis' technology acceptance model (TAM) developed in 1989. Davis (1989) argues, "[F]uture research is needed to address how other variables relate to usefulness, ease of use, and acceptance" (Davis, 1989; p.320). Kumar, Sachan and Mukherjee (2018) argue that perceived awareness, perceived usefulness, and trust in government and internet positively affect e-government adoption (Kumar *et al.*, 2018).

2.1. Awareness

Awareness of e-government in the present study implies the responsiveness to the information and communications technologies (ICT) provided to citizens and expats by the government of Qatar to improve efficiency. Previous research suggests that in order "[T]o eliminate the aspects of digital divide and to encourage the citizen to adopt and use the government services online, the government should increase the level of awareness and usage of ICT among citizens" (Al-Hashmi and Suresha, 2013; p. 45). Mutahar, Daud, Ramayah, Isaac and Aldholay (2018) note that awareness has a significant impact on perceived ease of use and perceived usefulness in which in turn are major predictors of the intention (Mutahar *et al*., 2018). Similarly, Al-Somali, Gholami, and Clegg (2009) showed effects of awareness on usefulness perception and ease of use (Al-Somali *et al.,* 2009). Moreover, Alshehri and Drew (2010) discovered that one of the barriers towards the awareness of e-government services in Saudi Arabia are due to lack of programs in promoting the e-government services benefits and advantages.

2.2. Perceived Trust

Different authors have argued that trust in internet and government significantly affect e-government adoption (Chang et al., 2005; Carter and Bélanger, 2005; Al-Shafi and Weerakkody 2008; Carter *et al.,* 2011). Urbina and Abe believe that "[T]he respondents' willingness to provide personal information on government websites suggests that they generally find e-government trustworthy" (Urbina and Abe, 2017; p. 76) implying that trusting an e-government is a crucial step towards the adoption of such paradigm. Furthermore, it is imperative to build this cumulative trust in order to facilitate and encourage the interaction between government and their customers (Abu-Shanab and Al-Azzam, 2012). Meftah, Gharleghi, & Samadi (2015) note that there is a significant relationship between culture, awareness , trust and adoption of e-government. However, trust had the highest level of relationship toward e-government adoption.

2.3. Ease of use

Perceived Ease of Use is "the degree to which a person believes that using a technology will be free from effort" (Davis, 1989; p.320). It refers to an individual's assessment of the mental effort involved in using a system. Having said that, it is important to note that the relation between ease of use and intention to adopt e-government have not being settled yet. On one hand, Davis believes that ease of use is not directly related to the intention to adopt (Davis, 1989). On the other hand, Hamid, Razak, and Bakar & Abdullah (2016) found that perceived ease of use significantly predicts intention to use e-government services.

2.4. Usefulness

Perceived usefulness refers to "the extent to which a person believes that using a particular technology will enhance her/his job performance," (Davis 1989; p. 320). Perceived usefulness is found to be a significant construct in the e-government adoption literature (Hamid *et al.*, 2016). Moreover, Davis (1989) argues that perceived usefulness has a direct effect on an individual's intention to use an information system through attitude in a voluntary setting. Horst, Kuttschreuter and Gutteling believe that perceived usefulness of e-services is the main determinant of the intention to use e-government services (Horst *et al.*, 2006).

2.5. Intention to Adopt Mobile Applications

Talukder, Chiong, Dhakal, Sorwar and Bao argue that "[D]espite the widespread use of mobile government (m-government) services in developed countries, the adoption and acceptance of m-government services among citizens in developing countries is relatively low"(Talukder et al., 2019, p. 419). Tassabehji, Hackney and Maruyama believe that "e-government is one way in which developing countries can focus on developing good governance and strengthening civil society to improve the quality of government and motivate citizens to participate in the political process" (Tassabehji *et al*., 2018. P. 1022). Liu, Li, Kostakos, Goncalve, Hosio, & Hu in China, have examined a number of variables effecting intention to use mobile government. Results show that perceived ease of use, near-term and long-term usefulness, integrity, benevolence, image and social influence have significant and positive influence on the intention to use mobile government (Liu et al., 2014).

2.6. Research about the E-Government Mobile Applications in Qatar

Qatar is a very rich Middle East state in the Arabian Gulf region with a tiny fast-growing population of over 2,7m people in 2019. The Qatari government established its e-Government initiative in July 2000 to perform a new dynamic relation between government and citizens (Al-Shafi and Weerakkody, 2010). To accelerate the transformation of Qatar into an information-based society, the Emir Sheikh Hamad bin Khalifa Al-Thani established the Supreme Council for Information and Communications Technology (ictQATAR) in 2004 and in June2013, the Ministry of Information and Communications Technology (ictQatar) was established (ictqatar, 2013-2014). The Qatar e-Government 2020 Strategy was launched in May 2014 with a key objective to offer end-to-end e-services (ictQatar, 2014) including development of mobile applications for 60% of e-services (MOTC, 2017). In 2014, Qatar ranked 44 up from 48 in 2012 in the UN e-Government Development Index (United Nations E-Government Survey, 2016; p.115). Moreover, in 2016, Ministry of Transport and Communications was established from merging ictQatar with Ministry of Transport (Ahmed, 2018). What's more, Kylie Wansink states that 2,400 e-government services made available in Qatar in 2018 through both website and mobile applications (Wansink, 2020). The Hukoomi website made it clear that "Qatar Digital Government 2020 strategy will benefit everyone" (Hukoomi, 2020).

3. TECHNOLOGY ACCEPTANCE MODEL

Previous research has shown that both the technology acceptance model (TAM) and the theory of planned behavior (TPB) have been used to explain and predict the intention of using technologies. According to Keiran Mathieson both TMA and TPB predicts intention to use technology quit well, but TAM is a lot easier to apply (Mathieson, 1991). Moreover, TAM is widely used in research when explaining the intention to adopt any technology (Okazaki & Barwise, 2011). Roy (2017) believes that embracing of technological products and services by users has been mainly explained using TAM and its extensions. Moreover, TAM suggests that

perceived usefulness and perceived ease of use of a technology influence an individual's attitude toward and use of that technology (Davis *et al.*, 1989). A study conducted by López-Nicolás, Molina-Castillo, and Bouwman, confirms that TAM predicts the attitudes and behavior of users of mobile services, based on perceived usefulness and perceived ease of use of mobile systems (López-Nicolás *et al.*, 2008).
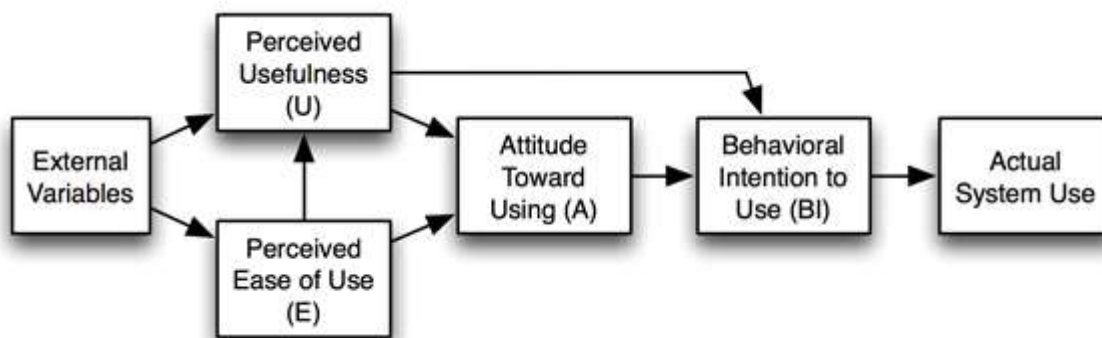

Figure 1 Technology Acceptance Model developed by Davis, Bagozzi, and Warshaw (1989)

4. NEED FOR THE STUDY

Qatar is turning to technology to help all citizens to have access to online public services. Rima Charbaji El- Kassem states that "daily life in Qatar seems very similar to everyday life in any smart digital society in Europe" (Rima, 2020; p. 75). Benmansour, Lari and Shockley believe that "[T]he State of Qatar has implemented many e-government initiatives but little has been done to investigate their progress" (Benmansour *et al.*, 2019; p.13). Few years ago, citizen used to take a trip to government offices to finish their transactions and "[T]here is a growing concern that although the numbers of mobile subscribers are increasing at a very fast pace in Qatar, actual M-commerce activities in the country remain low"(Khan *et al.*,, 2015; p.54).

Al-Kubaisi and other researchers believe that e-Government projects involve high costs and risk (Al-Kubaisi 2018; Mendonça and Sapio 2013). Heeks, amongst many other scholars, argues that most of the e-Government initiatives are failures. He claims that this proves to be true in both industrialized and developing countries as some indicators relatively point that 70-80% of e-Government projects are either total or partial failures (Heeks 2003; Misuraca 2009).

With all that said, the researchers in this study believe that m-Government has a high potential to support government online initiatives, even though it is still relatively unknown and unexplored, however it is considered to be the most important layer of future e-Government services. Moreover, m-Government has the ability to reach out the existing e-Government applications to larger sections of the society, in ways that were not possible before (Misuraca 2009; Kumar and Sinha 2007). In fact, m-Government could be regarded as a great tool to obtain higher rates of efficiency and to bring about more effectiveness in the e-Government. There are many examples of successful and effective implementations of m-Government supporting the current online activities of governments around the world. Qatar for example has made "Ehteraz", its Coronavirus contact tracing mobile app mandatory (Rajagopalan, 2020). New York city, for example, has allowed mobile phone users to send text and multimedia messages to the main emergency number 911. Other places in the world, such as Washington DC, has published road work updates based on different districts using Google map features on mobile phones (Mendonça and Sapio 2013). These are only examples

of the potential m-Government has to self-monitoring of the public works sector and perform surveillance of the government's own activity.

Mobile applications have rapidly evolved as they have become almost the mainstream in public's daily lives, however m-Government is still under continuous development and needs to be further explored as it s an emerging phenomenon (Mendonça and Sapio 2013). Thus, this study is only a step to provide a new body of empirical knowledge, amongst many needed research endeavors, to further tackle the adoption factors of embracing m-Government in Qatar.

5. RESEARCH PROBLEM

The research question the present study aims to answer is: What are the factors that influence respondents to adopt e-government services through mobile applications in Qatar? In addressing this question, four research hypotheses were generated based on a review of the relevant literature. These are as follows:

H_1: The more positive respondents' awareness of the e-government services provided by mobile applications, the more likely they are to adopt e-government services through mobile applications.

H_2: The more the respondents' trust of the e-government services provided by mobile applications, the more likely they are to adopt e-government services through mobile applications.

H_3: The more positive respondents' perceived ease of use, the more likely they are to adopt e-government services through mobile applications.

H_4: The more positive respondents' perceived usefulness of the mobile applications, the more likely they are to adopt e-government services through mobile applications.

6. PROCEDURES AND METHODOLOGY

6.1. Sample Selection

Using highly trained field researchers, data was collected using Computer-Assisted Telephone Interview (CATI) during the period February 2020 to Mach 2020, from a representative sample of 1,340 adults in Qatar aged 18 to 77 years old. The valid responses rate was 18.6% (1340 out of 7200). To guarantee against method biases at the response stage, the researchers assured participants there were no right or wrong answers (El-Kassem *et al.*, 2018). As a whole, the instrument was undergone a robust process of development and testing.

7. VALIDITY AND RELIABILITY

Based on the review of the literature, the researchers constructed an instrument (questionnaire) to gather the needed data. The current study is based on fifteen statements and each response uses a 5-point Likert scale: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. Factor analysis was utilized as a data reduction technique to test the construct validity of the questionnaire instrument. Accordingly, two statistical tests were used to determine the appropriateness of using factor analysis.

First, using the Kaisers-Meyer-Olkin (KMO) measure of sampling adequacy produced a score of 0.691, more than the recommended value of 0.50. Second, the Bartless test of sphericity result was significant (Chi Square = 1828.742, P = 0.00), indicating that there are adequate inter-correlations between the questionnaire statements that allow the use of factor analysis. Oblique rotation was used as extraction and rotation methods using a criterion of an

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Eigen value greater than 1 yielded five factors. The five-factor solution accounted for 54.846% of the total variance and were easy to label:

Table 1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.691
Bartlett's Test of Sphericity	Approx. Chi-Square	1828.742
	df	105
	Sig.	.000

Table 2 Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.983	19.887	19.887	2.983	19.887	19.887	1.648
2	1.443	9.617	29.504	1.443	9.617	29.504	1.934
3	1.402	9.349	38.853	1.402	9.349	38.853	1.786
4	1.300	8.670	47.523	1.300	8.670	47.523	1.838
5	1.098	7.323	54.846	1.098	7.323	54.846	1.894
6	.982	6.547	61.393				
7	.869	5.795	67.189				
8	.842	5.612	72.801				
9	.798	5.317	78.118				
10	.696	4.641	82.760				
11	.645	4.297	87.057				
12	.591	3.938	90.995				
13	.473	3.151	94.146				
14	.448	2.985	97.131				
15	.430	2.869	100.000				
Extraction Method: Principal Component Analysis.							
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.							

Table 3 Structure Matrix

	Component				
	1	2	3	4	5
Q43b_3 The information I get from government mobile applications is valid	.565	.040	.063	.124	.150
Q43b_2 I trust doing financial transactions over mobile applications such as (Kahramaa,	.491	.212	.054	.247	.160
Q24_6 It is easy for me to Adopt new technologies	.357	.750	.159	.171	.220
Q24_5 It is easy to learn new technology	-.208	.728	.135	.002	-.041
Q24_4 It is easy for me to Keep up with latest mobile applications	.294	.684	.055	.137	.337
Q24_2 It is easy for me to Use a mobile application on a smart phone, such as an iPhon	-.301	.438	-.043	.127	.308
Q39a The apps are very straightforward	-.021	.105	.793	.088	.218
Q39b The apps are very useful	-.075	.080	.747	.008	.186

Q39c The apps are visually appealing	.316	.110	.619	.262	.038
Q43a_6 The use of mobile applications could assist me to engage more with the governmen	.269	.117	.106	.830	.132
Q43a_8 In the future, I intend to use government mobile applications to interact with t	-.437	.061	.019	.674	.089
Q43a_7 I recommend to my family and friends that they use government mobile application	.410	.101	.235	.645	.238
Q43a_3 I know the benefits of using the government's mobile applications	.253	.174	.204	.112	.723
Q43a_2 I receive enough information about the government's mobile applications	.310	.185	.202	.176	.714
Q43a_1 I am aware of the government's mobile applications (such as Metrash and Oun)	-.203	.114	.115	.136	.624
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.					

a) The first factor "Perceived Trust (privacy)" accounts for 19.8874 percent of total variance and is defined by two items:

- The information I get from government mobile applications is valid
- I trust doing financial transactions over mobile applications

b) The second factor "Perceived Ease of Use" accounts for 9.617 percent of total variance and is defined by four items:

- It is easy for me to adopt new technologies
- It is easy for me to learn new technologies
- It is easy for me to keep up with the latest mobile applications
- It is easy for me to use a mobile application on the smart phone such as an IPhone

c) The third factor "Perceived Usefulness" accounts for 9.349 percent of total variance and is defined by three items:

- The apps are very straightforward to use
- The apps are very useful
- The apps are very visually appealing

d) The fourth factor "Intention to Adopt E-government through Mobile Applications" accounts for 8.670 percent of total variance and is defined by three items:

- The use of mobile applications could assist me to engage more with the government

- In the future, I intend to use government mobile applications to interact with the government
- I recommend to my family and friends that they use government mobile applications

e) The fifth factor "Awareness" accounts for 7.323 percent of total variance and is defined by three items:

- I know the benefits of using the government's mobile applications
- I receive enough information about the government's mobile applications
- I am aware of the government mobile applications such as (Metrash and Oun)

8. PATH ANALYSIS–SEM

The researchers used Path–SEM which is a very sophisticated technique and highly recommended by scholars. As Cai (2013) comments, "The structural equation models are linear simultaneous equation models derived from a successful merger of path analysis and factor analysis" (Cai, 2013; p. 117). It is imperative to note here that based on the literature review, the researchers believe the PLS-SEM and Path Analysis-SEM debate remains unresolved.

The aim of Path Analysis–SEM is to determine the direct and indirect effects between variables and to test a priori theory-driven model (explanation and prediction), as compared to the purpose of PLS–SEM that is to estimate the effect of one variable on another while removing the effect of other variables (Prediction). Moreover, Path Analysis is a form of structural equation modeling and Confirmatory Factor Analysis (CFA) is known within SEM as the measurement model. According to the Oxford Dictionary of Statistical Terms, a path analysis can be performed as a hierarchical (sequential) set of structural equation model after establishing the construct validity of the instrument, (Dodge, 2003).
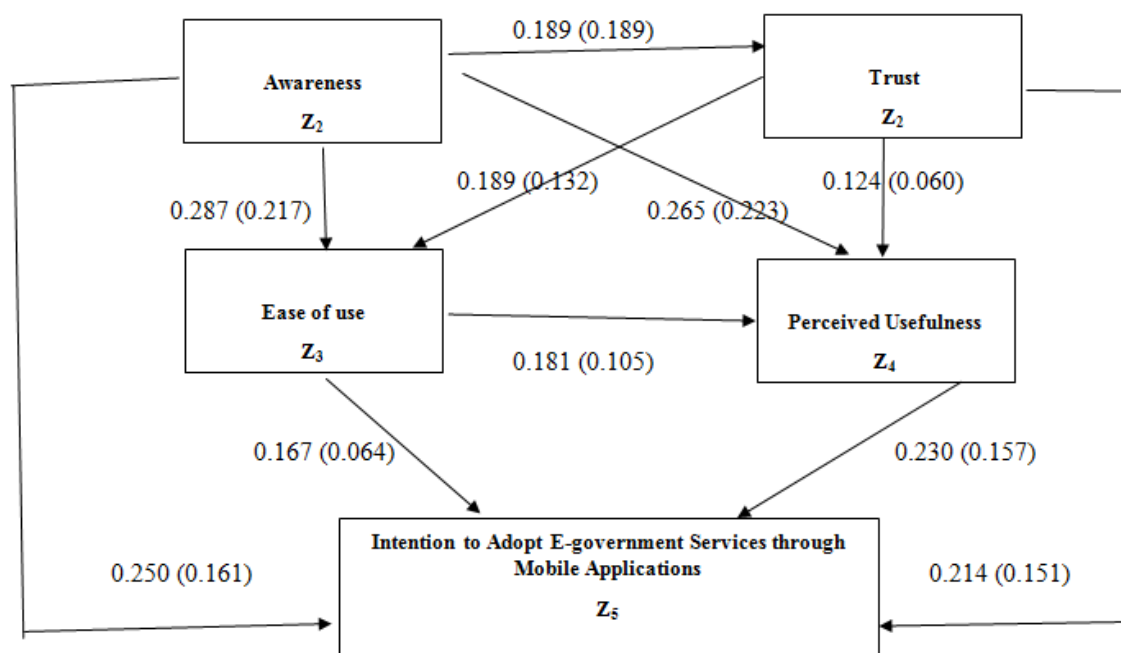

Figure 2 Path Analysis

As shown in Figure 2, a latent variable (factor) is an underlying dimension (cause) of multiple observed behaviors (variables). The figure shows that the factor "Awareness" as a hypothetical latent variable is assumed to be the cause of the observed correlation among the three observed variables (questionnaire statements).The factor "Perceived Trust" as a hypothetical latent variable is assumed to be the cause of the observed correlation among the two observed variables. The factor "Perceived Ease of Use" as a hypothetical latent variable is assumed to be the cause of the observed correlation among the four observed variables. The factor "Perceived Usefulness", as a hypothetical latent variable is assumed to be the cause of the observed correlation among the three observed variables. The factor "Intention to Adopt E-government through Mobile Applications ", as a hypothetical latent variable is assumed to be the cause of the observed correlation among the three observed variables.

Figure 1 shows the direct and indirect effects between the variables in the recursive SEM path analytic model. The number between parentheses is the true direct relation between the two variables. The other number is the Pearson simple relation that exemplifies the total effect (direct plus indirect effects). Moreover, the mathematical model underlying the relations that lead to solving the recursive causal model are as follows:

$$Z_3 = \beta_1 Z_1 + \beta_2 Z_{2} + u$$

$$Z_4 = \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_{3} + u$$

$$Z_5 = \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_{3} + \beta_4 Z_4\, u$$

Figure 2 demonstrates the results from this study's path analysis of the structural causal model. The true direct effect between two variables is shown between parentheses as an estimated path coefficient converted into a standardized Z-score while the other numbers are the zero-order relation (i.e., the total relation = direct effect + indirect effect). Beginning with the exogenous independent variables (1. Awareness) and then adding endogenous predictors (2. Perceived Trust 3. Perceived Ease of Use and 4. Perceived Usefulness) and moving toward the dependent variable (5. Intention to Adopt E-government through Mobile Applications), the path diagram shows the path-analytic decomposition of the total relation into direct and indirect effects.

As expected, the endogenous variable "Perceived Trust" depends on the exogenous variables "Awareness." Moreover, the endogenous variable "Perceived Ease of Use" depends on the exogenous variables "Awareness" and "Perceived Trust". These variables in turn affect "Perceived Usefulness". The last endogenous variable "Intention to Adopt E-government through Mobile Applications" is dependent on all of the variables in the model. As Table 6 demonstrates, all of the variables that explain the variation in the dependent variable "Awareness, Perceived Usefulness and Perceived Trust" are highly significant at the 5% percent level and "Perceived Ease of Use" is significant at the six percent level. The RSQ for the regression model is 0.119 with an $F = 29.198$ which is sig at 0.000.

Table 4 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.345[a]	.119	.115	.48462
a. Predictors: (Constant), Awareness, Trust, Usefulness, Ease				

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Table 5 ANOVA

ANOVA[a]						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.430	4	6.857	29.198	.000[b]
	Residual	202.448	862	.235		
	Total	229.878	866			
a. Dependent Variable: Intention						
b. Predictors: (Constant), Awareness, Trust, Usefulness, Ease						

Table 6 Coefficients

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	.593	.057		10.382	.000
	Trust	.104	.023	.151	4.569	.000
	Ease	.065	.034	.064	1.898	.058
	Usefulness	.116	.025	.157	4.690	.000
	Awareness	.129	.028	.161	4.661	.000
a. Dependent Variable: Intention						

The standardized path coefficients in Figure 2 show the relative strength and the direction from the causal variable to the outcome variable. The total relation is improved via other variables shown in Figure 2. These findings are consistent with previous research indicating awareness and perceived trust have a significant impact on perceived ease of use and perceived usefulness in which in turn are major predictors of the intention (Mutahar *et. al*, 2017 & Kim, 2012).

9. DISCUSSION AND CONCLUSION

The adoption of e-government through mobile applications is spreading at a fast rate owing to the ease-of-use, (Kimberley, 2014). However, although a significant amount of research into intention to adopt e-government services through mobile applications has been conducted worldwide, very few research has been conducted particularly in Qatar.

The results support this study's hypothesis that the more the respondents' awareness of the e-government services provided by mobile applications, the more likely they are to adopt e-government services through mobile applications. Awareness has a substantial effect on perceived ease of use and perceived usefulness in which consequently are major antecedents of the intention (Mutahar *et. al*, 2017). The increase of awareness about mobile applications and its benefits will increase the perception of usefulness and ease of use of mobile applications and consequently the intention to adopt mobile applications.

Moreover, the hypothesis that the more the respondents' trust of the e-government services provided by mobile applications, the more likely they is to adopt e-government services through mobile applications is also supported. The increase of awareness in mobile applications will increase trust in addition to increasing the perception ease of use and usefulness of mobile applications and consequently the intention to adopt mobile applications (Kim, 2012).

This study's results further support the hypothesis that the more the positive the respondents' perceptions of the ease of use, the more likely they are to adopt e-government services through mobile applications. Previous research reveals that users adopt a technology faster if it has ease of adoption a technology will be adopted more rapidly if it has

technological compatibility and ease of adoption (Benedetto *et al* , 2003). A person who perceives mobile applications too difficult to use or a waste of time will be unlikely to want to adopt this services, while a person who perceives e-government services as very useful and as easy to learn will be more likely to adopt the e-government services through mobile applications.

Finally, findings of this study provides a road map for decision makers in Qatar. It is consistent with all empirical studies (Pedersen & Nysveen, 2003), the more the positive the respondents' perceptions of the usefulness of the mobile applications, the more likely they are to adopt e-government services through mobile applications. It has been pragmatic that information usefulness of mobile applications affects users' intention towards adopting mobile applications.

10. LIMITATIONS

There are certain limitations of this research paper that create opportunity for future research without undermining the importance of the present study. The study was conducted in Qatar and the findings are specific to the Qatari market. Therefore, future studies could examine the same model with data from various countries. Conducting comparative studies from different countries would enhance generalizability of the present study and contribute more to the mobile media field of research. Moreover, the data collection for this study happened before the Covid-19 lockdown. Therefore, future studies could examine the respondents' perceptions towards the mandatory Coronavirus contact tracing mobile application, Ehteraz. However, in spite of the mentioned limitations, the novelty of the study lies in its use of the technology acceptance model (TAM) and the findings generated provide thoughts to be considered by academicians and decision makers in Qatar.

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REFERENCES

[1] Abu-Shanab, E., & Al-Azzam, A. (2012). Trust Dimensions and the adoption of E-government in Jordan. International Journal of Information Communication Technologies and Human Development (IJICTHD), 4(1), 39-51.

[2] Ahmed, F. B. J. (2018), "Challenges of the knowledge society: Exploring the case of Qatar." Global Economic Observer, 6(1), 39-54.

[3] Al-Kubaisi, A. S. (2018), "Enhancing the Adoption of E-Government Systems through Open Government and Open Government Data (OGD) Initiatives in Qatar." Journal of Information Engineering and Applications Vol.8, No.1, 2018. The full text is available at: https://www.iiste.org/Journals/index.php/JIEA/article/view/40706

[4] Al-Hashmi, A. and Suresha (2013), "Evaluating the Awareness of E-government in the Republic of Yemen", International Journal of Computer Applications (0975 – 8887) Volume 67– No.6.

[5] Accenture (2012), *"Always On, Always Connected - Finding Growth Opportunities in an Era of Hypermobile Consumers,"* retrieved from Always On, Always Connected -

Rima Charbaji El-Kassem, Ali Selham Al-Kubaisi, Maitha Mohammed Al Naimi, Aisha Mohammed Al-Hamadi, Noof Abdulhadi Al-Rakeb

Finding Growth Opportunities in an Era of Hypermobile Consumers. The full text is available at: http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture_EHT_Research_2012_Consumer_Technology_Report.pdf

[6]   Al-Shafi, S., & Weerakkody, V. (2008), "Adoption of Wireless Internet Parks: An Empirical Study in Qatar". Proceedings of the European and Mediterranean Conference on Information Systems, ISeing Press.

[7]   Al-Shafi, S. and Weerakkody, V. (2010), "Factors Affecting E-Government Adoption in the State of Qatar", European and Mediterranean Conference on Information Systems, Abu Dhabi, 12-13 April.

[8]   AlShihi, H. (2006), "Critical Factors in the Adoption and Diffusion of E-government Initiatives in Oman," (Doctoral dissertation, Victoria University).

[9]   Alshehri, M., & Drew, S. (2010), "Challenges of E-Government Services Adoption In Saudi Arabia From An E-Ready Citizen Perspective." World Academy of Science, Engineering and Technology, 66, 1053-1059.

[10]   Al-Somali, S. A., Gholami, R., & Clegg, B. (2009), "An Investigation into the Acceptance of Online Banking in Saudi Arabia." Technovation, 29(2), 130-141. The full text is available at: https://www.sciencedirect.com/science/article/abs/pii/S0166497208000850

[11]   Benedetto, C. A., Calantone, R. J. & Zhang, C. (2003), "International Technology Transfer Model and Exploratory Study in the People's Republic of China." International Marketing Review, 20(4), 446-462.

[12]   Benmansour, A. N. (2019), "Citizens and Expatriates Satisfaction with Public Services In Qatar -Evidence From A Survey", International Journal of Social Economics, Vol. 46 No. 3, pp. 326-337. The full text is available at: https://doi.org/10.1108/IJSE-03-2018-0118.

[13]   Benmansour, N. A., Lari, N. A., & Shockley, B. (2019), "Exploring Local Governance and E-Services in Qatar." International Journal of Public Administration in the Digital Age (IJPADA), 6(4), 1-13. The full text is available at: https://www.igi-global.com/article/exploring-local-governance-and-e-services-in-qatar/241263

[14]   Cai, L. (2013), "Potential Applications of Latent Variable Modeling for the Psychometrics of Medical Simulation." Military Medicine, 178(suppl_10), 115–120.

[15]   Carter, L., & Bélanger, F. (2005), "The Utilization of E-Government Services: Citizen Trust, Innovation and Acceptance Factors," Information Systems Journal, 15(1), pp.5-25.

[16]   Carter, L., Shaupp, L. C., Hobbs, J., & Campbell, R. (2011), "The role of security and trust in the adoption of online tax filing." Transforming Government: People, Process and Policy, 5(4), 303-318.

[17]   Chang, I. C., Li, Y.-C., Hung, W.-F., & Hwang, H.-G. (2005), "An Empirical Study on the Impact of Quality Antecedents on Tax Payers' Acceptance of Internet Tax-Filing Systems," Government Information Quarterly, 22(3), pp.389-410.

[18]   Davis, F. D.; Bagozzi, R. P.; Warshaw, P. R. (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models", Management Science, 35 (8): 982–1003, doi:10.1287/mnsc.35.8.982

[19]   Davis, F.D. (1989), "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology". MIS Quarterly, 13(3), pp.319-40.

[20]   El-Kassem, R. C. (2020), "Factors Influencing Reading News On The Mobile Devices in Qatar in Light Of Augmented Reality (Ar) & Virtual Reality (Vr)," International Journal of Advanced Research in Engineering and Technology (IJARET) indexed by Scopus. Volume 11, Issue 5, May 2020, pp. 74-83, doi: 10.34218/IJARET.11.5.2020.009.

[21] El-Kassem, R.C., Sellami, A. & Elawad, E.F.E. (13 November 2018), "Antecedents and Consequences of Perceived Student Employability In Qatar: Parental Perspective". International Review on Public and Nonprofit Marketing. Springer Berlin Heidelberg, Volume 15 PP: 1–15. The full text is available at: https://doi.org/10.1007/s12208-018-0214-6

[22] Ghyasi, A. F. and I. Kushchu (2004), "M-Government: Cases of Developing Countries." Proceedings of the 4th European Conference on E-Government, Castle Dublin, Ireland.

[23] Hamid, A. A., Razak, F. Z. A., Bakar, A. A., & Abdullah, W. S. W. (2016), "The Effects Of Perceived Usefulness And Perceived Ease Of Use On Continuance Intention To Use E-Government." Procedia Economics and Finance, 35(2016), 644-649.

[24] Heeks, R. (2003), "Most E-Government-For-Development Projects Fail: How can Risks be Reduced?" Manchester: Institute for Development Policy and Management, University of Manchester (Vol. 14).

[25] HO, A. T. K. (2002), "Reinventing Local Governments And The E-Government Initiative." Public administration review, 62, 434-444.

[26] Horst, M., Kuttschreuter, M., & Gutteling, J. M. (2007), "Perceived Usefulness, Personal Experiences, Risk Perception and Trust as Determinants of Adoption of E-Government Services In The Netherlands." Computers in human behavior, 23(4), 1838-1852.

[27] Hukoomi (2020), "Qatar Digital Government 2020 Strategy". Retrieved on June 11th, 2020. The full text is available at: https://portal.www.gov.qa/wps/portal/about-hukoomi/integrated-e-government?searchText=Qatar%20rank%20on%20e-serveces

[28] Johnson, R. (2010), "Apps Culture Reinventing Mobile Internet." Electronic Engineering Times, 1588, 24-30.

[29] Khan, H. Talib, Mohd.F. and Faisal, N. (2015),"An Analysis of the Barriers to the Proliferation of M-Commerce in Qatar", Journal of Systems and Information Technology, Vol. 17 Iss 1pp. 54 – 81.

[30] Kim, B. (2012), "A Study of Antecedents of Continuance Intention in Mobile Social Network Service: The Role of Trust and Privacy Concerns." Knowledge Management Research, 13(4), 83-100. The full text is available at: http://www.koreascience.or.kr/article/JAKO201228764977983.page

[31] Kim, E., Lin, J. S., & Sung, Y. (2013), "To App or Not to App: Engaging Consumers Via Branded Mobile Apps." Journal of Interactive Advertising, 13(1), 53-65.

[32] Kumar, R., Sachan, A. and Mukherjee, A. (2018), "Direct Vs Indirect E-Government Adoption: An Exploratory Study", Digital Policy, Regulation and Governance, Vol. 20 No. 2, pp. 149-162. DOI.org/10.1108/DPRG-07-2017-0040

[33] Kumar, M. and O. P. Sinha (2007), "M-Government–Mobile Technology for E-Government." International conference on e-government, India, Citeseer.

[34] Liu, Y., Li, H., Kostakos, V., Goncalves, J., Hosio, S., & Hu, F. (2014), "An empirical investigation of mobile government adoption in rural China: A case study in Zhejiang province." Government Information Quarterly, 31(3), 432-442.

[35] Mathieson, K. (1991), "Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior", Information Systems Research. Vol. 2, No. 3 (1991), pp. 173-191

[36] Mendonça, S., & Sapio, B. (Eds.) (2013), "Foresight for Dynamic Organizations in Unstable Environments: A Search For New Frameworks." Routledge.

[37]   Misuraca, G. C. (2009), "E-Government (2015): Exploring M-Government Scenarios,
        Between ICT-Driven Experiments and Citizen-Centric Implications." Technology analysis
        & Strategic management 21(3): 407-424.

[38]   Mutahar, A. M., Daud, N. M., Ramayah, T., Isaac, O., & Aldholay, A. H. (2018), "The
        Effect of Awareness And Perceived Risk on the Technology Acceptance Model (TAM):
        Mobile Banking in Yemen." International Journal of Services and Standards, 12(2), 180-
        204.

[39]   Ministry of Information and Communications Technology –ictQATAR (2013- 2014).
        ictqatar annual report 2013-2014.pdf. The full text is available at:
        https://www.motc.gov.qa/sites/default/files/ictqatar_annual_report_2013-2014.pdf

[40]   Ministry of Information and Communications Technology - ictQatar (2014), "Qatar E-
        Government 2020 Strategy Executive Summary." Doha, Qatar. The full text is available
        at: https://www.motc.gov.qa/sites/default/files/documents/Qatar%20e-
        Government%202020%20Strategy%20Executive%20Summary%20English.pdf

[41]   MOTC (2017), "Government Mobile Services Framework". Ministry of Transport and
        Communications. Doha, Qatar.

[42]   López-Nicolás, C., Molina-Castillo, F. J. & Bouwman, H. (2008), "An Assessment of
        Advanced Mobile Services Acceptance: Contributions from TAM and Diffusion Theory
        Models." Information & Management, 45,359-364.

[43]   Okazaki, S., & Barwise, P. (2011), "Has the Time Finally Come For the Medium of the
        Future? Research on Mobile Advertising." Journal of Advertising Research, 51(150th
        Anniversary Supplement), 59-71.

[44]   Pedersen, P. E., & Nysveen, H. (June 2003), "Usefulness and Self-Expressiveness:
        Extending TAM to Explain the Adoption of a Mobile Parking Service." In Proceedings of
        the 16th Electronic Commerce Conference, Bled, Slovenia. https://domino.fov.uni-
        mb.si/proceedings.nsf/0http://www.journalofadvertisingresearch.com/content/51/1_50th_
        Anniversary_Supplement/59.shortdaccbe501fc1256ea2002e0617/$FILE/50Peders.pdf

[45]   Rajagopalan, M. (2020). "Qatar Has Made its Coronavirus Contact Tracing App
        Mandatory", BuzzFeed News. Retieved on June, 6th 2020. The full text is available at:
        https://www.buzzfeednews.com/article/meghara/qatar-coronavirus-tracking-app-
        mandatory

[46]   Roy, S. (2017), "App Adoption And Switching Behavior: Applying The Extended Tam In
        Smartphone App Usage. "JISTEM-Journal of Information Systems and Technology
        Management, 14(2), 239-261. The full text is available at:
        https://www.scielo.br/scielo.php?pid=S1807-17752017000200239&script=sci_arttext

[47]   Saxena, S. (2017), "Factors Influencing Perceptions On Corruption In Public Service
        Delivery Via E-Government Platform", Foresight, Vol. 19 No. 6, pp. 628-646.
        DOI.org/10.1108/FS-05-2017-0013

[48]   Serra, L. C., Carvalho, L. P., Ferreira, L. P., Vaz, J. B. S., & Freire, A. P. (2015),
        "Accessibility Evaluation Of E-Government Mobile Applications In Brazil." Procedia
        Computer Science, 67, 348-357. The full text is available at:
        https://www.sciencedirect.com/science/article/pii/S1877050915031257

[49]   Suki, N. M., & Ramayah, T. (2010), "User Acceptance of The E-Government Services in
        Malaysia: Structural Equation Modelling Approach." Interdisciplinary Journal of
        Information, Knowledge, and Management, 5(1), 395-413.

[50]   Tassabehji, R. Hackney , R. and Maruyama, T. (2019, "Evaluating Digital Public Services
        a Contingency Value Approach Within Three Exemplar Developing Countries".

Information Technology & People Vol. 32 No. 4, pp. 1021-1043 Emerald Publishing Limited 0959-3845. DOI 10.1108/ITP-08-2017-0260

[51]   Talukder, S., Chiong, R., Dhakal, S., Sorwar, G. and Bao, Y. (2019), "A two-stage structural equation modeling-neural network approach for understanding and predicting the determinants of m-government service adoption", Journal of Systems and Information Technology, Vol. 21 No. 4, pp. 419-438. DOI.org/10.1108/JSIT-10-2017-0096

[52]   Taylor, D. G., Voelker, T. A. & Pentina, I. (2011), "Mobile Application Adoption by Young Adults: A Social Network Perspective." International Journal of Mobile Marketing, 6 (2), 60-70. The full text is available at:https://pdfs.semanticscholar.org/8881/b99e6fe1ab78bdbcf1fa73769c75c67625e0.pdf

[53]   United Nations E-Government Survey (2016), "United Nations E-Government Survey 2016 E-Government: In Support of Sustainable Development", p.115. Retrieved on June 11th, 2020. The full text is available at: at: https://www.egovernment.ch/files/3414/7031/5638/UN-eGov-Survey-2016.pdf

[54]   Urbina A. and Abe N. (2017) "Citizen-centric Perspective on the Adoption of E-Government in the Philippines" The Electronic Journal of e-Government Volume 15 Issue 2, (pp63-83). The full text is available at: www.ejeg.com

[55]   Wansink, K. (2020), Qatar - Telecoms, Mobile and Broadband - Statistics and Analyses. Sydney: Paul Budde Communication Pty Ltd.

[56]   World Bank (November 5, 2001), LAC PREM – "Issues Note: E-Government and the World Bank".