

Customer's Adoption of Mobile Government Services: The Role of Trust and Information Privacy

Dr. Sulaiman Althuwaini and Dr. Mohamed Saleh Salem

Faculty of Business Studies, Arab Open University, Riyadh, Saudi Arabia

*Correspondence: Dr. Sulaiman Althuwaini, Email : dean.fbs@arabou.edu.sa

ABSTRACT: The purpose of the study is to examine the factors that impact the intention of Saudi citizens to use a mobile government smartphone application (Absher). Saudi Arabia seeks to invest and develop the infrastructure of the government's mobile services, to be one of the leading countries in the region. Smartphone applications backed by mobile technologies have changed mobile services use which permit anywhere at any time access. Drawing on technology acceptance theories and relevant literature, this study developed and tested a structural model that integrates factors perceived usefulness, perceived ease of use, perceived privacy and trust in order to investigate the predictors of Absher use intention in the Saudi Arabia. The proposed model is tested using structural equation model (SEM) on data collected using an online questionnaire. Statistical analysis revealed that intention to use Absher was significantly associated with perceived trust, security and privacy, ease of use, and usefulness. Drawing on the technology acceptance model and trust theory, this study develops and empirically examines a model for users' intention to use mobile government services. This study contributes to the marketing literature by examining the impact of PU, PEOU and trust on mobile government services acceptance in developing countries.

Keywords: Mobile government services, Intention to use, Trust, Structural equation model

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Author(s): Dr. Sulaiman Althuwaini and Dr. Mohamed Saleh Salem

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1. INTRODUCTION

The tremendous growth of mobile technologies has led to fundamental changes in business interaction with customers. It becomes a crucial form of interaction between buyers and service providers and part of daily use of consumers. Mobile technologies have evolved in a way that academics and practitioners cannot turn a blind eye on its benefits in business development. Due to m-commerce inherent characteristics such as ubiquity, internet accessibility, personalization and immediacy, it is considered a new marketing tool that can be used to offer bespoke services [1]. Because of its rapid growth of wireless networks and smartphone such as 5G communication technologies which imposed the transition towards providing services via mobile devices. In return, these developments forced those service providers to take an active role in providing mobile services facilitating user's life.

Mobile government (m-government) nowadays has received more attention over the last years [2]. As stated earlier, mobile technologies developments introduce additional service delivery which cannot be ignored by businesses. M-government providers need to remain competitive to produce benefits and deliver results to both individuals and businesses and to positively enhance national economic growth. Governments are utilizing internet technologies to improve service quality in order to transform relationships with

individuals, businesses and other government entities [3, 4]. M-government affords a powerful and transformational capacity to both extend access to existing services, and expand the delivery of new services. This will foster the users (citizens) participation in service delivery and definitely reduce the costs at the same time. Accordingly, assessing governmental efforts to use mobile devices as platforms for providing public services and adoption of these services need further investigation [2, 5].

Current research examines the important elements that may influence customers to use m-government services. Governments have enabled most of its services available via smartphone applications. Smartphone services have revealed some kinds of security threats which can endanger the use of such services. This is due to the fact that individuals provide confidential information and exposed to these security threats which influence the individuals-government relationship. M-government matters because of the users changing behavior in mobile services context. The convenience of m-government services frees users from the physical or location-related constraints existed in conventional service delivery. Rapid developments in mobile technologies have heightened the need for examining customers' behavioral intention to adopt m-government services [1, 6]. To fill this gap, this study was developed to test hypotheses using framework of the extended TMA as the foundation to determine the predictors of users' intention to use m-government services in Saudi Arabia. In addition, user acceptance is considered one of the critical success factors of m-government services [4, 5]. Accordingly, this study aims to measure the users' acceptance of mobile government services by investigating the important factors that may play a major role from the users' perspective.

This research examines the important elements associated with intention to use m-government services. The knowledge

obtained from this study aims to enrich m-commerce research because of its relative novelty and potential applications [4, 7]. It is worth to mention that m-commerce research lacks investigation of critical factors required for better implementation [8]. With reference to scant studies pertaining to developing countries, the current study investigates users' intention to use m-government services (smartphone-based application). This can help service providers to understand the users' needs so they can improve the impediments and deficient of these services.

This research is organized as follows: first, a brief literature review is presented on the technology acceptance model (TMA), perceived privacy and perceived trust based on which model and hypotheses are formulated to predict intention to use m-government services. Second, research methodology and new model is tested. Subsequently, findings and major results are introduced. Finally, discussions, limitations and the managerial implications were formulated before concluding the paper.

2. LITERATURE REVIEW

Technology acceptance model (TAM) was developed by Davis [9]. It relies on work related to theory of reasoned action [10] and theory of planned behavior [11, 12]. TAM postulates that perceived usefulness (PU) and perceived ease of use (PEOU) are crucial in determining attitude and anticipation regarding the use of technological tools [9, 13-15]. Besides, Davis [9] stipulated that the behavior must be voluntary. Perceived usefulness (PU) is the extent to which a person believes that using a particular technology will enhance his or her job performance [9, 16]. Furthermore, Igbaria, Parasuraman, and Baroudi [17] proposed that perceived usefulness will be positively related to computer usage.

Perceived ease of use (PEOU) in contrast, is the degree to which a person believes that using a technology will be free from effort [9, 18]. Technology acceptance model was extensively discussed in mobile marketing context [15, 19-29].

Perceived ease of use and perceived usefulness are positively correlated with intention to use SMS [19], Intention to use mobile payment [23], intentions to use mobile shopping services, Intention to use m-commerce [20, 25], actual use of mobile payment [21], intention to use mobile social network services, and internet banking use with smart phones [27]. Additionally, perceived ease of use was found to be an antecedent of perceived usefulness [15, 21, 23, 27, 28]. Perceived ease of use and perceived usefulness were found to be antecedents of perceived value. In contrast, they were found to be negatively correlated with perceived security concern [27].

Although TAM model does not include attitude towards the behavior, evidence from previous studies found (PEOU) and (PU) to be positively correlated with attitude towards the use of mobile marketing activities [22, 29].

Trust is defined as the willingness of an individual to be vulnerable to the actions of another party based on the expectation that other party will perform safe actions a part from any monitoring or controlling that other party. Lack of trust is suggested to be a great barrier that prevents consumers from adopting e-commerce and m-commerce as regular activities in their daily lives. In online context defined online trust as consumers perceptions of how a web-site would meet consumers' expectations, how believable the web-site's information, and how much confidence the website is. Based on the previous definitions, one can define mobile trust or m-trust as willingness of mobile users (consumers) to be vulnerable to actions of other party's mobile website, mobile app, or mobile message based on the expectation that other party is safe and trustworthy a part from monitoring or controlling activities.

Trust is a multi-dimensional construct. It includes three dimensions. The first dimension is institutional or organizational trust. It refers to individual trust in organization [30]. This dimension is related to individual's previous opinions and judgments about an organization or a brand. If this opinion was good then it will continue when the individual interconnect with this organization through its website or mobile app. The second dimension of trust is the interpersonal trust. It refers to trust in another specific person such as a customer recommends or likes a brand in a social network site or a mobile app [30]. The level of trust in this person will affect individual's final decision about buying or not buying this brand. The last dimension is dispositional trust and it refers to an individual's ability to trust in others in general [30].

In mobile marketing context, trust is positively correlated with mobile marketing acceptance [31], intention to adopt mobile payment [26, 32], intention to accept mobile advertising [33, 34], intention to use mobile commerce, and attitude towards mobile advertising [35].

Security in mobile phone context is an important factor. Consumers perceive that mobile commerce has different threats [4]. Financial information can be misused by some organizations or individuals. Security consists of three parts. First, confidentiality that refers to limitations of information access to prevent any unauthorized access to this information. Second, integrity that refers to trustworthiness of information resources. Third, availability that refers to continuity of mobile services in general [30].

In 2005 and 2006, Mobile marketing association conducted surveys to measure consumer acceptant of mobile marketing. In 2005 survey, 36 percent of respondents reported that they do not accept mobile marketing because of its intrusiveness and perceived risk. In 2006 survey, 35 percent of respondents reported the same (MMA 2005, 2006).

Privacy refers to individuals' ability to control information about themselves. It also refers to individuals' expectations that organizations will treat their information fairly [30]. There are four elements related to privacy in mobile marketing

context. First, is choice that refers to the extent to which an individual has the ability to participate (opt-in) or not to participate (opt-out) in a mobile marketing campaign. This meaning of choice is similar to permission based mobile marketing that has been discussed in several studies [4, 36-38]

Second; notice that refers to the privacy policy stated in organization website or mobile app. This privacy policy explains what types of personal data the organization collects, stores, and uses. It also clarifies whether the organization share consumers' personal information with other party or not. Third; value that refers to the incentives and rewards that organizations give their customers in return to sharing their personal information. Finally, access and control that refer to the ability of consumers to access, modify, and control their personal information stored in organizations' databases [30].

Privacy concept received a great amount of attention in marketing and technology research. In mobile marketing context, privacy is suggested to be negatively correlated with attitude towards mobile advertising [35], intention to disclose location-related information in mobile social network sites [39], and trust in mobile advertising [26, 35]. In contrast, researchers [22, 40] found privacy to be positively correlated with attitude towards mobile advertising [40] and attitude towards using mobile payment system [22].

Previous studies presented that Technology Acceptance Model (TAM) introduced by Davis [9] included two basic constructs: perceived usefulness (PU) and perceived ease of use (PEOU) as the major determinants influencing user's perception to accept new technology. With the uncertainty and increased risk surrounding m-commerce environment, basic TAM constructs are not enough to determine user's acceptance of m-commerce applications and services. The previous discussion of the literature concluded to additional constructs represented in perceived risk (security and privacy concerns), and perceived trust as additional determinants of intention to use m-commerce. Figure 1 depicts the proposed research model. Based on research model, the following hypotheses were formed:

1. Perceived privacy of customer's information is associated with intention to use m-government services
2. Perceived trust in m-government service provider is positively associated with the use of its services
3. Perceived trust in m-government service provider mediates the relationship between privacy and intention to use m-government services
4. Perceived usefulness and ease of use are associated with intention to use m-government services through perceived trust

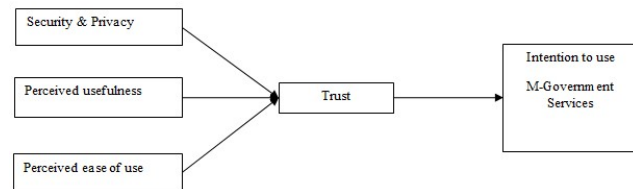


Figure 1: Hypothetical model

3. METHODOLOGY

The purpose of this study is to investigate the effect of perceived ease of use, perceived usefulness, security, privacy and trust on intention to use m-government application. The questionnaire consists of demographic data, the model assessing the electronic m-government application and the intention to use. The sample of this study was drawn from users who used m-government application (Absher) previously.

The data was collected using a survey consisting of three parts. First, an introduction to research and the rationale of the study. Second, demographic questions like age, gender, education, status, employment and income. Third, main research items borrowed from previous literature to measure model constructs [4, 7, 41]. This adaptation was important to ensure items' validity and reliability. Also, it reduced misunderstanding and subsequent measurement errors. Items were five-point Likert scale ratings from (strongly agree, agree, neutral, disagree, and strongly disagree).

The study used an online questionnaire. The link was distributed through social media platforms and e-mail. A total of 235 responses were received. Only 211 (89%) responses were valid, and 24 of them were excluded because they were not completed and valid for data analysis.

In the sampling process, given that the number of Absher users are 17 million (MOI. 2020), it was difficult to give all Saudi citizens an equal chance to participate in this study due to costs, time and efforts limitations. For that reason, researchers focused on Saudi citizens using social networks. The overall sampling technique employed in this study is stratified sampling in which the sample contains respondents from different ages, level of education and income. This sampling technique allowed researchers to collect information from the targeted group more accurately. The sample selection process continued until the desired sample size was reached [42]. Data collection effort began in the first week of April 2020 and lasted for five weeks. Next section presents the main results of the collected surveys.

4. DATA ANALYSIS

4.1 Demographic

Table 1 sets out the descriptive statistics of the respondent in this study. Forty-nine percent of respondents were female and 51 percent were male. The sample shows that the largest age group of respondents was 25-30 years (42%), followed by 31-35 (22%), then 14-24 (22%) and > 51 (6%). More than 72% of

the respondents were high school students, undergraduate and postgraduate represented were 14% equally. In terms of employment status, 47% had a Full-time job, 37% were students and 16% of the respondents had a PT jobs.

Respondent Characteristics	Number of Respondents	Percentage
Gender:		
Male	107	51%
Female	103	49%
Age:		
18-24 years old	29	14%
25-30 years old	91	42%
31-35 years old	46	22%
36-40 years old	12	6%
41-50 years old	20	10%
51 years old and above	12	6%
Status:		
Single	131	62%
Married	67	32%
Others	12	6%
Education:		
High school	150	72%
Undergraduate	30	14%
Post-graduate	30	14%
Others		
Employment:		
Full-time	99	47%
Students	77	37%
Part-time	34	16%
Others		
Income:		
Less than SAR 5000	107	51%
Less than SAR 10000	45	21%
Less than SAR 2000	46	22%
More than SAR 21000	12	6%

Table 1: Demographic Profile

4.2 Measurement Model Evaluation

In this data analysis, a two-steps analysis procedure was performed to test the measurement model following steps proposed by [43-45] using AMOS 25 software. First, we run confirmatory factor analysis (CFA) to identify the configuration by which each degree loads on a particular construct. Second, the factor loadings indicator was checked and indicated that all items are above the recommended level [45]. The first run of CFA showed that the majority of the measurement items were loaded above 0.60, which indicated the data set has a good reliability level and estimate the model fit [46]. In this part, no items were dropped, and 20 items were retained for further analysis. The results of CFA are shown in Table 2, the good-of-fit was satisfied, and the chi-square is significant ($\chi^2 = 455.605$). The GFI value is 0.951, the CFI value is 0.901, and RMSEA value is 0.06 are satisfied and above the recommendation levels.

Besides, standardized factor loading was used to evaluate the convergent validity of each construct [47]. As shown in Table

2, the factor loadings for each construct were range from 0.763 to 0.938 and it indicating that each factor has achieved the criteria above the recommended level of 0.50, and supported the evidence of construct validity [45]. To assess construct validity for perceived of use, perceived ease of use, security and privacy, trust, and intentions to use, and the AVE and CR were calculated [45]. Table 2 shows the AVE ranged from 0.641 to 0.821 and CR ranged from 0.899 to 0.938.

Constructs	Items	Loadings	α	CR	AVE
Intention to Use	IN1	0.863	0.890	0.932	0.821
	IN2	0.938			
	IN3	0.915			
Perceived Ease of Use	PE1	0.811	0.899	0.930	0.768
	PE2	0.879			
	PE3	0.915			
Perceived of Use	PU1	0.842	0.917	0.938	0.751
	PU2	0.866			
	PU3	0.880			
Security & Privacy	PU4	0.847			
	PU5	0.897			
Trust	SP1	0.808	0.844	0.906	0.764
	SP2	0.911			
	SP3	0.899			
Trust	TR1	0.837	0.860	0.899	0.641
	TR2	0.822			
	TR3	0.798			
	TR4	0.781			
	TR5	0.763			
Notes: $\chi^2 = 455.605$ / CMIN/df = 1.6503					
GFI = 0.951; CFI = 0.901; RMSEA = 0.06					

Table 2: Measurement Model

Constructs	Intention to Use	Perceived Ease of Use	Perceived of Use	Security & Privacy	Trust
Intention to Use	0.906				
Perceived Ease of Use	0.478	0.877			
Perceived of Use	0.414	0.378	0.867		
Security & Privacy	0.509	0.777	0.405	0.874	
Trust	0.737	0.731	0.455	0.819	0.801

Table 3: Discriminant Validity

To assess the discriminant validity for each construct, the square root of the AVE was calculated. As shown in Table 3, the square root of AVE between each pair of factors was higher than the correlation estimated between factors and indicated that discriminant validity achieved [45, 48].

4.3 Structural model

A structural model of perceived of use, perceived ease of use, security and privacy, trust, and intentions to use were conducted to estimate the parameters and to test the hypotheses. In this model as shown in Table 4, the results show that chi-square is significant ($\chi^2 = 809.781$; p -value = 0.001). The GFI value is 0.902, and the CFI value is 0.899 have met the threshold of 0.90, and the value was in the range of the recommended level and considered the model is satisfactory. The model had an RMSEA value of 0.09, which was below range level and considered satisfactory. Table 4 shows the results, which indicate the acceptable goodness-of-fit model.

Hypothesis	Estimate s	p- Values	Results
Perceived Ease of Use -> Trust	0.218	0.000	Supporte d
Perceived of Use -> Trust	0.131	0.001	Supporte d
Security & Privacy -> Trust	0.596	0.000	Supporte d
Trust -> Intention to Use	0.737	0.000	Supporte d
Notes: $\chi^2 = 809.781$; $CMIN/df = 5.621$ GFI = 0.902 ; CFI = 0.899; RMSEA = 0.09 Significant at $p < 0.05$			

Table 4: Structural Model

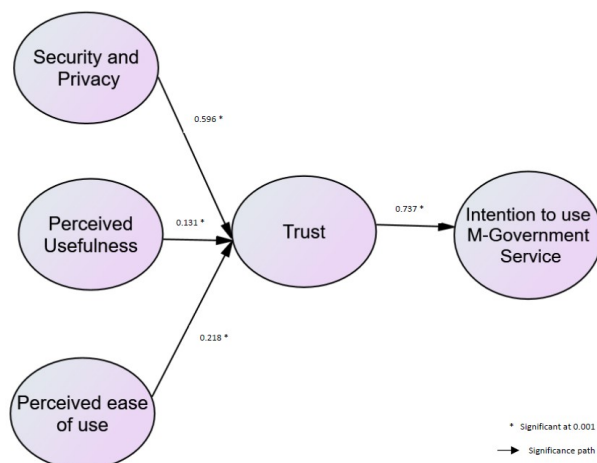


Figure 2: Structural Model

5. DISCUSSION

The objective of the study was to investigate the effect of perceived usefulness, perceived ease of use, security and

privacy, trust on intention to use mobile government services. As shown in Table 3, the results indicated that all hypotheses are supported (H1, H2, H3, and H4). The results demonstrated that trust (H4, $\beta = 0.737$) played an essential role in enhancing intention use, followed by security and privacy, perceive ease of use, and perceived usefulness (H3, H1, H2 - $\beta = 0.596, 0.218, 0.131$) respectively. Those three factors have significant association with trust and intention to use m-government application.

According to what presented earlier, understanding the success of m-government services is still under development. This indicates that research field has emerging trends which make it clear that future requires a strong demand for multi-channel service delivery. Furthermore, the prosperity of mobile devices, including smartphone applications, is forcing governments towards m-government deployment [49]. This study clarifies the critical role of trust in m-government adoption. Previous literature showed that lack of trust is one of the common proved reasons for individuals' decision not to adopt m-commerce services [26, 32]. Therefore, the more confident the users are about the service provider, the more they will use mobile service and vice versa.

The present study makes several noteworthy contributions to security and privacy factors in m-government context. Users' behaviors are intensely affected by perception of security and privacy. Information that users disclose to the service provider while using the smartphone application may contain financial or personal information which prevent them from disclose it to others. Studies such [7, 30] revealed that security variable is significant in adopting m-government services. Due to the large number of mobile hacking attacks, users sometimes refuse to use mobile services due to their fear of spreading their information to unreliable parties.

On the other hand, ease of use and usefulness are significant factors in encouraging users to use smartphone applications. The user can now access the application of any government organization and get benefit of services that were not easy to perform before. Previously, users (citizens) had to go the governmental organization in person and wait for a long time to be served. Government created opportunities for citizens to use m-government smartphone application, while cutting office stationery budget. Ease of use and usefulness were proved to be positively associated with intention to use. This indicates that Saudi citizens recognize m-government services to be compatible with their work and lifestyle.

Similar to previous research, this study found that perceived usefulness and trust predicted the intention to use m-government services. This conclusion is dependent on the context of developing countries, where technology is advancing and increasingly being used by citizens. In such cases, it is highly recommended that governments make sure their services are compatible with citizens' work and lifestyles, are easy to use, and are highly secure in terms of technology and systems. In Saudi Arabia, assurance regarding these issues

should be communicated to the people via the media, using the power of social influence and social networks.

6. RESEARCH LIMITATIONS

First, this study was limited to Saudi citizens, while m-government services target both citizens and expatriates. Future studies may consider targeting both of them. Saudi Arabia is moving to digital transformation at the national level replacing traditional service processes. Second limitation relates to exploring factors affecting m-government application services adoption which are relatively new in m-government research. Despite the addition of study's contribution, findings were obtained from one single study that targeted a specific set of citizens in Saudi Arabia.

Technology infrastructure and m-government services vary in different countries which make generalization of the findings an issue. However, this study highlights the significant role of trust in m-government services adoption. The third limitation is related to the few variables that have been tested in the context of intention to use m-government services, future research may explore additional variables in order to improve the predictive capability of the model.

7. CONCLUSION AND FUTURE RESEARCH

This study was conducted to explore factors relating to Saudi citizens' intention to use m-government services. The research framework was based on the perceived usefulness, perceived ease of use, integrated with constructs of trust and security/privacy. The proposed research model was empirically tested and proved to be reliable.

The results were obtained from a sample of 211 m-government application users indicated that the model is able to explain the elements that determine citizens' adoption of m-government services. The proposed framework provides Saudi government with a number of determinants of m-government services acceptance by its citizens. These determinants should be considered at the strategic level when it comes to m-government applications planning and development that should focus on the four significant constructs – namely, perceived usefulness (PU), perceived ease of use (PEOU), security/privacy, and trust.

Questionnaire data and feedback of the current study revealed information that is critical to understanding end-user's intention to use m-government services. This information can be used to motivate Saudi society to increase m-government services adoption. Based on a better understanding of citizens' needs, the government can improve its services, which, in turn, would enhance citizens' wellbeing. Indeed, this cycle is critical for better m-government implementation in Saudi Arabia.

However, this study offers a framework for future studies relevant to m-government services. One specific path for

future work, especially in light of rapid advances in mobile technology (e.g. wearable mobile technology), would be further investigation of the predictors of citizens' adoption of m-government services identified in this study. Another potential area of research would be to assess m-government smartphone applications adoption using moderators such as gender, education, and age. This kind of profile-based investigation would help government to better understand citizens' requirements, thus allowing it to provide support and services accordingly. Based on the research model in this study, another avenue for further study is to explore the constructs of perceived usefulness and trust in government services, especially in developing countries.

In conclusion, because m-government services are still in the early stages, there are rich and varied opportunities for research regarding emerging technologies, new government processes, and citizens' behaviors relating to this important topic. In developing and testing a model of citizen's acceptance of m-government services, the current study advances academic research on the topic and opens doors for additional studies aimed to better understanding consumers' intention to use such services. In the Saudi context, this research reveals a promising future for m-government services. It provides insights that can help improve these services and allow the Saudi government to better serve its citizens through useful, easy to use, secure, and trustworthy technology. The results of this study would be beneficial to private and public mobile service providers, government departments, decision makers and the business community.

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