

# MGAUM—Towards a Mobile Government Adoption and Utilization Model: The Case of Saudi Arabia

Mohammed Alonazi, Natalia Beloff, Martin White

**Abstract**—This paper presents a proposal for a mobile government adoption and utilization model (MGAUM), which is a framework designed to increase the adoption rate of m-government services in Saudi Arabia. Recent advances in mobile technologies such as Mobile compatibilities, The development of wireless communication, mobile applications and devices are enabling governments to deliver services in new ways to citizens more efficiently and economically. In the last decade, many governments around the globe are utilizing these advances effectively to develop their next generation of e-government services. However, a low adoption rate of m-government services by citizens is a common problem in Arabian countries, including Saudi Arabia. Yet, to our knowledge, very little research has been conducted focused on understanding the factors that influence citizen adoption of these m-government services in this part of the world. A set of social, cultural and technological factors have been identified in the literature, which has led to the formulation of associated research questions and hypotheses. These hypotheses will be tested on Saudi citizens using questionnaires and interview methods based around the technology acceptance model. A key objective of the MGAUM framework is to investigate and understand Saudi citizens perception towards adoption and utilization of m-government services.

**Keywords**—E-Government, M-Government, citizen services quality, technology acceptance model, Saudi Arabia, adoption framework.

## I. INTRODUCTION

**D**UE to the current revolution in Information and Communication Technologies (ICT), governments throughout the world are going through an era of digital transformation. E-government employs ICT tools such as the Internet and mobile technologies in order to improve government transparency, accountability and communication between the government and public by providing better access to information and services, public services delivery and public governance [1], [2]. In recent years, many governments have utilized mobile and wireless technologies to develop new and innovative service delivery channels, which is also referred to as mobile government (m-government) [3], [4]. M-Government is thus defined in this study as the use of mobile technology to deliver and improve e-government services and information to citizens, businesses and all government agencies. Prior studies have considered it both as

an extension or replacement of e-government or as separate to it [4], [5], but Kushchu & Kuscu (2003) suggest that it advances e-government service delivery by offering the public an extra channel to access information and services. Although m-government operates on the same principles as e-government there are particular features that distinguish it. The distinguishing features are:

- Mobility is the main advantage of m-government for citizens, allowing them to access the network anywhere and anytime [6].
- Mobile phones can be easily turned on at any time, allowing citizens easy access to messages from government service providers [6].
- Recently in developed or developing countries, the most efficient way for people to communicate is arguably the mobile phone, which has become a primary part of daily life [6]. Therefore, providing government services via mobile might be the easiest and most beneficial route for citizens.
- Accessing the web via mobile phone is increasing every day. This means that users do not have to go home to access their computer or visit the physical place of the service provider in order to access services and information [6].
- The economic situation of each country may affect and limit access to the Internet. This limitation refers to the availability of computers and the penetration of fixed Internet [6], mobile services can circumvent these limitations.

Thus, the advantage of adding an m-government channel to government services is that it offers unique opportunities for real-time and personalized access to government information and services through the advantage of wireless technology [7]. Given the affordability, reachability, immediacy and ubiquity of m-services as well as the relatively low level of digital literacy required to operate them, the provision of government services and information in this way has real benefits, especially for users in remote areas [8]. Therefore, adopting an m-government system with the above characteristics will arguably be even more beneficial for both government and citizens.

This study will focus on understanding and analyzing factors that could influence citizens adoption and utilization of m-government services in Saudi Arabia from two different perspectives that of Saudi citizens and that of key

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officials responsible for implementing e-government and m-government services in different Saudi ministries. The study aims to provide the knowledge needed to ensure a high level of success when implementing m-government services in this context. This paper explains the development of a theoretical model used to conduct this research and the use of a mixed quantitative and qualitative methodology for subsequent testing and validation.

## II. BACKGROUND AND CONTEXT

Although m-government emerged several years ago, the adoption of e-government services in general and m-government services in particular is still below expectations [1], [2], [9], [10]. Also, m-government in most developing countries including Saudi Arabia is at an initial stage and faces a number of issues related to adoption, implementation and use [1], [11], [12]. The maturity or the success of m-government differs between governments around the world and is dependent on various factors including a country's ICT infrastructure, user adoption, mobile device and internet penetration rates, reliability, security, privacy and effectiveness [7]. A review of the literature suggests that there is a critical knowledge gap concerning how these factors could influence the adoption and utilization of m-government services. This study aims to fill this gap by offering a new theoretical model with which to conduct empirical research in this area. Research results arising from this new model will provide valuable new insights about the key factors affecting adoption of m-government services in Saudi Arabia. This awareness will be useful for policy makers who wish to employ strategies that would enable faster and more efficient adoption of m-government services; as well as providing useful information for researchers and the ICT industry.

Studies conducted in diverse areas such as rural China and Malaysia [8], [13], [14] have adapted the Technology Acceptance Model (TAM) (see Fig. 1) and demonstrated how a range of social, cultural and technical factors have been usefully added to the TAM to explain what influences citizens' intention to make use of m-government systems to access information and services.

Cultural and technological factors such as culture, trust and the lack of necessary infrastructure has been shown to be of key importance by studies that compared m-government adoption in developed and developing countries [15], [16]. However, literature on the adoption of m-government in Arabic countries is still fairly limited, but studies in these areas [15]-[20] have highlighted the importance of factors such as trust and the extent to which using m-government services was perceived as being compatible with the citizens' lifestyle and culture, awareness and system quality as well.

There is a need to conduct further research into m-government adoption in Saudi Arabia, as to our knowledge, there have not been empirical studies that take factors such as culture, or compatibility into account, or which properly investigate citizens' perspectives about the quality of both human and technical factors involved in service quality, or which explore the problems from the perspectives of the providers as well as the intended users.

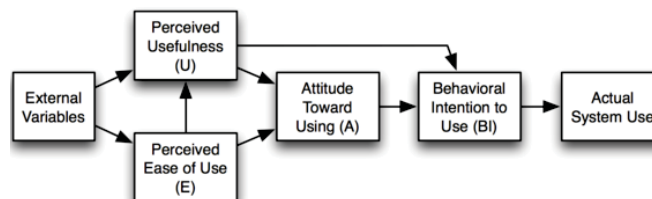


Fig. 1 Technology Acceptance Model (TAM)

## III. TECHNOLOGY ADOPTION THEORIES AND MODELS

Various technology adoption theories and models have been developed that aim to analyze, investigate and understand factors that affect the use of technology in specific contexts. A particularly used model is the Technology Acceptance Model (TAM) [21], other models include: Perceived Characteristics Innovation (PCI) [22], Theory of Reasoned Action (TRA) [23], Unified Theory of Acceptance and Use of Technology (UTAUT) [24] and the Diffusion of Innovation Theory (DOI) [25]. Much of the research into technology acceptance regarding the adoption of e-government and m-government uses technology acceptance models and theories either in their original form, combines them or adds extra factors.

This research work will exploit the TAM (see Fig. 1), which has been extensively tested and validated in acceptance behaviour over a wide variety of ICT innovations [2], [26], [27]. Previous studies have demonstrated that the TAM constructs of Perceived Ease of Use and Perceived Usefulness have provided a good starting point in analyzing intention to use m-government technology, but that the cultural dimension is a crucial one in exploring barriers to acceptance. As such, more research is needed to understand more precisely what barriers there are to acceptance of m-government in Saudi Arabia. The development of a technology acceptance model that fits the Saudi context is an essential aspect of this. Two key constructs from the TAM model and a set of social, cultural and technological factors identified in the literature as important factors for our context have provided a basis for the development of the MGAUM.

## IV. CONCEPTUAL FRAMEWORK

In order to analyze factors that affect users' adoption and use of m-government, this research has developed a model called the Mobile Government Adoption and Utilization Model (MGAUM).

MGAUM has been developed based on a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and usage of technologies. MGAUM integrates the Technology Acceptance Model with a number of social, cultural and technological factors, taken from other recognized theoretical acceptance models that have been identified as key factors in the literature. Further, MGAUM contains one dependent variable namely: Intention to use m-government (ITU), and three groups of independent variables namely: Practical Factors (PF), Human Factors (HF), and Technical Factors (TF). These independent

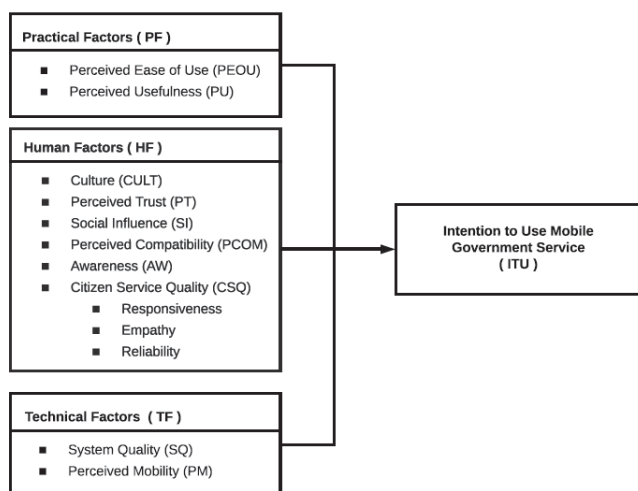


Fig. 2 The framework (MGAUM)

variables comprise the key factors that critically influence the adoption and use of m-government.

This model uses the TAM as a starting point along with factors from other theories to analyze how users adopt m-government services. Two factors were taken from the TAM: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). These two factors comprise the Practical Factors of MGAUM; the Human Factors are those that were revealed by the literature as important in further understanding the role played by the individual users acceptance in this context and the Technical Factors are those identified as most likely to affect the adoption of m-government. The final design of MGAUM also used the researchers experience of the local problems of accessing government services and information in Saudi Arabia to select those factors identified as key in the relevant literature. The main aim of MGAUM is to investigate the adoption of m-government services by citizens in developing countries, particularly Saudi Arabia, in order to increase the adoption rate of m-government services. The framework MGAUM is shown in Fig. 2.

The following sub-sections introduce each of the MGAUM factors and describe in detail their role in investigating the intention to use m-government services and information.

#### A. Practical Factors (PF)

When considering the adoption or rejection of a new technology there are two fundamental practical considerations for the user. First, whether that technology will help users to achieve their goals and second, how easy it is for them to operate that technology.

1) *Perceived Ease of Use*: PEOU is one of the key factors in the TAM, which explains users' intention to use technology [28]. The complexity of the technology has been found to have a negative impact on a users intention to use mobile government services when they consider using m-government services difficult or complicated. On the other hand, if a user finds m-government easy to use and that it saves time and effort, then this impacts positively on his/her

behavioural intention to adopt and use m-government services [5]. Furthermore, other prior studies have revealed that PEOU has a strong critical impact on user behavioural intention to adopt and use m-government services [7], [23], [25]. In view of this, the following hypothesis is posited:

**H1:** Perceived Ease of Use positively influences users intention to use m-government services.

2) *Perceived Usefulness* : PU is one of the most important determinants of a persons positive or negative attitude towards using a technology. Perceived Usefulness is refers to user perceptions about the potential benefits of using a specific Information Technology and Information Systems (IT/IS) and will directly influence a users behavioural intention [28]. Many previous and recent studies have empirically found that PU positively influences behavioural intention to use new technologies such as a banking information system which includes online credit card management, ATM services (automated teller machines) and online banking [29], [30], and m-services [31]. Regarding e-government and m-government, researchers found that PU is a vital factor that positively determines the intention to use m-government services when users perceive their benefits [32], [14], [33]. In view of this, the following hypothesis is posited:

**H2:** Perceived Usefulness positively influences users intention to use m-government services.

#### B. Human Factors

Human factors can play a significant role in the field of technology acceptance, because it potentially can improve productivity, transparency and communication leading to better information and services. So, it is important to understand the part human factors may play when implementing a system such as m-government.

Human factors refer to those factors that originate in individual users and affect the relationship between them and the system with which they interact. Human factors may also impact on adoption of that system. This construct is comprised of six significant factors that are likely to influence the adoption and utilization of m-Government: Culture Perceived Trust, Social Influence, Perceived Compatibility, Awareness and Citizen Service Quality.

1) *Culture* : The concept of culture (CULT) is complex and multi-dimensional in nature, and therefore, it is not an easy concept to define. According to Chang (2002), culture contains many different aspects, for example, religion, social structure, language, political institutions, education art and economic philosophy. Thus, a human culture is created over an extended period and changes over time [34].

There is no doubt that cultural factors can have a strong influence on the implementation and adoption of new technology [35]-[37]; particularly when this new technology is related to the development and improvement of citizens lifestyles [20]. Culture is considered as one of the non-technical factors that influence the implementation of new technology [38]. Cultural issues have been also investigated largely in e-government adoption literature, and a primary correlation has been found between cultural aspects

and intention to adopt and use new public services offered by either an e-government system [2], [35], [39], [40] or an m-government system [14], [16], [41]. Therefore, in this research, we argue that there are many cultural aspects that need to be investigated and analyzed to see how culture impacts on Saudi users adoption and use of an m-government system. The most important cultural aspects proposed in this research are the following:

- Image:

Image is an important norm in any society and is related to different social, behavioural, and also cultural aspects [19]. Image, in this context, refers to the degree that individuals believe that the adoption of the mobile service would improve their image or status in their community [22].

In a summary, e/m-government adoption might be an indication of the users familiarity with modern technologies, efficiency in using computer and Internet, a higher level of education and a high degree of modernism. Therefore, adopting e/m-government services is expected to add some measure of social value and prestige [19]. Accordingly, image is incorporated into this research model as an vital cultural aspect that needs to be investigated and explored in the Saudi context.

- Resistance to change:

In the context of this research, resistance to change refers to a citizens opposition to change their ways in accomplishing government transactions from the traditional channel (i.e. physically visiting government offices) to the electronic channels offered by e-government [42]. Resistance to change is believed to be one of the non-technical factors that could negatively affect the implementation of new technology, and this happens in general because people fear the unknown, or are not able to cope with uncertainty [43], [44]. In developing countries, some citizens could resist using e-government services due to trust issues, while others could resist using e-government services because they prefer to interact with the government face-to-face as this interaction makes them more confident [37].

- Interpersonal social networks (Wasta or Connections)

Wasta exists in many societies including Arab ones, and has been considered as an influential factor in the decision-making process [45]. In Arabic culture, Wasta is one of the prevalent forms of administrative corruption. Wasta, in general, can be defined as asking for help from a person, be it an employee or top manager, who has the power and authority to make decisions or the ability to exercise power, in order to achieve a certain result that the asker alone could not achieve [1]. It is expected that an m-government system will limit and reduce Wasta and other negative practices by declining unusual transactions and giving citizens equality when dealing with their transactions [46]. Since every transaction will be processed electronically and every action on the transaction will be controlled and recorded, some citizens could resist using an m-government system and persist in resorting to their personal connections inside government agencies to accomplish their transactions. Based on the previous discussion about the effect of the cultural

aspects (i.e. image, resistance to change and Wasta) on the behavioural intention to adopt and use m-government services, the following hypothesis is posited:

H3: Culture influences user intention to use m-government services.

2) *Perceived Trust*: Perceived trust (PT) can be defined as an individuals belief and expectation that another party will perform a particular action that is important to the trustor in the absence of the trustors control over the trustees performance [47]. User trust is viewed as an important factor in online environments due to the associated risks [48]. Indeed, trust has been theorized as a direct determinant of behavioural intention to use online services offered by e-government or m-government systems [2]. When using e/m-government, especially when it comes to online transactions, risks such as sharing and storing personal information are involved [19], [20].

In the context of e-government and m-government, trust has a major role to play in helping users to overcome their anxieties about the perceived risks while using government services online [20]. In fact, existing e-government literature has reported that one of the key barriers to adoption of e-government services was a lack of trust in online transactions. This was due to the unreliability and risks that usually occur when such transactions are made online [49], [50]. Therefore, user trust should be taken into account in all environments that have any degree of security risk, to increase users trust towards making transactions on online government services [51], [52]; and to ensure the credibility of the services offered via the Internet [53]. In view of this, the following hypothesis is posited:

H4: Trust positively influences users intention to use m-government services.

3) *Social Influence*: Several definitions of social influence (SI) have been found in the literature; Venkatesh [24] defines it as "the degree to which an individual perceives that important others believe he or she should use the new system". In the e-government context, Weerakkodya [54] defines SI as the normative pressure of associated members like family or friends that influences the intention to use e-government. Social influence is one of the constructs in the Unified Theory of Acceptance and Use of Technology Model (UTAUT) and is regularly considered as an important determinant of users behavioural intentions [24], [55], [56]. In the early stage of the adoption of any technology, individuals usually have little or no experience in using that technology; for that reason, what they believe could be greatly influenced by others opinions [55]. In other words, the opinions of other people, for instance reference groups, family, opinionated leaders, friends and colleagues will positively or negatively play a role key in influencing individuals decision to adopt new technological innovations [56], [57]. Accordingly, the following hypothesis is posited:

H5: Social Influence affects users intention to use m-government services.

4) *Perceived Compatibility*: Perceived compatibility (PCOM) is a construct in the Diffusion of Innovation (DOI) model, and suggests that a user has the intention

to adopt and accept a new technology if it synchronizes with his/her behavioural, social, cultural, and psychological beliefs [16]. In the m-government context, compatibility refers to what degree prospective end users perceive an application or service to be convenient and compatible with their requirements, routines and lifestyles and the way they prefer to access government services [18]. It is thus very important that the new technology fits in with peoples work and home life [17]. Compatibility is considered one of the important aspects in innovation adoption because it has a significant influence on individual intention to adopt a new technology, not just in the context of general information technology, but also when considering the services that can be provided by mobile phones [58]. Moreover, a high level of compatibility with the innovation will raise users intention to adopt and use it. On the other hand, if an innovation seems to be incompatible with citizens values, behaviour or social, cultural, and psychological beliefs, it will negatively affect their intention to adopt this innovation [59]. In view of this, the following hypothesis is posited:

H6: Compatibility positively influences users intention to use m-government services.

5) *Awareness* : In order for users to adopt a new service offered by the government they need an awareness (AW) about what services are available, how these services are relevant to them, and how they can access and use these services [33], [60]. In more detail, users should be aware of a new system including its functions and the services that it provides to them, before implementing any interactive e-government system [20].

The AW construct involves many aspects, which includes the extent to which citizens are informed about how public administration will be transformed, the mission and objectives of e-government, implementation of innovation, the advantages and disadvantage of implementing and using e-government services [19] and that e-government offers its services via mobile technologies [33]. In addition, the public needs to be aware about m-government services and public organizations need to provide more information about the benefits of using m-government services to ensure general public accessibility to m-government services [61]. These aspects supposedly impact significantly on users adoption and acceptance of e-government and m-government services. Therefore, governments, especially in developing countries, need to put more effort into promoting citizens awareness of the available e-government services, particularly those in remote areas. The lack of awareness could increase the digital divide and lead to e-government failure [19]. Also, Public awareness could be enhanced in various ways including: interactive advertising and social media campaigns as well as traditional advertising methods such as adverts on TV, on public transport and newspapers, posters and brochures [12], [20]. Therefore, the following hypothesis is posited:

H7: Awareness positively influences users intention to use m-government services.

6) *Citizens Service Quality*: The concept of service quality (CSQ) has been addressed in several fields such as commerce, management, marketing, education and IT/IS. Previous studies

have shown the importance of this factor in electronic environments; ranging from mobile services [62], e-commerce [63], e-banking [64], e-learning [65], m-government [66] to e-government [20], [67]. Parasuraman [68] defines service quality as a customers evaluation of the overall experience of services. Service quality explains the difference between users perception and their expectations of the service offered by service providers [69]. Parasuraman [68] also developed and validated the SERVQUAL model to measure service quality. In this model, service quality has a number of dimensions; these are: reliability, responsiveness, competence, access, communication, security and understanding the user.

Later, Sureshchandar [70] identified five main service quality dimensions reliability, tangibility, assurance, responsiveness and empathy. In the e-government domain, some researchers suggested that responsiveness reliability and empathy are the most applicable dimensions to measure service quality [67]. Therefore, these dimensions will be used in this research to measure service quality. Reliability focuses on the service providers ability to deliver the promised service dependably. Responsiveness entails the customers perception of the promptness of the service provider; and Empathy measures whether the service provider cares and gives enough attention to the customers best interests [68].

In the e-government domain, the significant role of service quality as a key driver of the overall service experience has been widely acknowledged; and one the main goals of developing e-government services is to bridge the gap between citizens expectations and service delivery [71]. To attain this goal, it is vital for public organizations to recognize the expectations of their citizens and tailor e-government services to satisfy those expectations [67], [71]. Delivering high quality e-government services by public organization would help to achieve higher levels of citizens engagement, participation and willingness to use e-government services [69]. Accordingly, the following hypotheses are posited:

H8: Service quality factors (responsiveness, reliability and empathy) positively influence user intention to use m-government services.

H8.1: Reliability positively influences user intention to use m-government services.

H8.2: Responsiveness positively influences user intention to use m-government services.

H8.3: Empathy positively influences user intention to use m-government services.

### C. Technical Factors

In understanding the adoption of a system such as m-government it is important to identify the key technical factors that impact on users of the system. In this study System Quality comprises users perceptions of general technical factors that affect use and Perceived Mobility, which focuses on how that feature of m-government is perceived.

1) *System Quality*: In 1992, Delone & McLean introduced the success model in information systems (IS), which measured three dimensions, namely: system quality (SQ), information quality, and service quality; and declared that

system quality and information quality are not only primary predictors for the use of an IS, but also influence the satisfaction levels of users [72]. Therefore, system quality is frequently considered as one of the important quality factors that need to be addressed in any particular system, especially when analyzing the intention of users to adopt and use the system. System quality refers to the quality level of the system including the technical aspects that are recognized by users, and which can affect their willingness and intention to adopt and use e-government systems [1]. Petter & McLean (2009) define system quality as performance of the IS in terms of reliability, convenience, ease of use, functionality, and other system metrics. System quality elements are very closely related to service quality elements and ease of use [73]; and include different aspects such as navigation, visual appeal and access speed [74], [75].

In the context of this study, the system quality construct will comprise technical issues including unresponsive service, links not working, bugs, screen touch problems, freezing, access speed, navigation and layout. Furthermore, unlike personal computers, mobile terminals have screens which are small and the input can be inconvenient. Therefore, these issues will be also covered.

The relationship between the quality of the system and user acceptance in the IT/IS context has been the subject of several studies; the majority of which revealed that users beliefs are significantly affected by system quality [76]-[79]. Moreover, a high correlation has been reported between system quality and the adoption of e-government and m-government services [20], [57]. Accordingly, this research posits the following hypothesis:

H9: System Quality positively influences user intention to use m-government services.

2) *Perceived Mobility*: The rapid advances in wireless technologies allowed individuals to access information and interact with electronic services from anywhere at any time. Mobility can be defined as the feature that allows users to access information during the state of mobility [80]. Mobility is a unique feature that mobile devices have brought to individuals, compared to static devices such as desktop computers; and it offers many advantages to users as it makes communication and access to information and services available irrespective of location or time.

Using government services anytime and anywhere, without the need for a wired network, and not having to rely on time and location is one of the unique features of m-government [80]. People usually use computers at home or work to access the internet, but when people are travelling or far away from their home or office, the easy way to access the internet is through mobile devices, for that reason, the term of mobility emerges recently when people need to access the internet so quickly [5].

A review of mobile data services adoption literature showed that mobility is among the significant factors that influence the adoption of mobile services [81], [82]. However, even though mobile data services have grown rapidly, research about the impact of mobility on use behaviour is still limited [81], [82]. The mobility feature of m-government and its ability

to make access to services always available will drive citizens intention to use m-government services [80]. In view of this, the following hypothesis is proposed:

H10: Perceived Mobility positively influences users intention to use m-government services.

We believe that the MGAUM will allow a more precise analysis of m-government adoption in the Saudi context. The factors in the MGAUM have been used as a basis for developing the research instruments to be used in the empirical study. The next section outlines our proposed methodology.

## V. PROPOSED METHODOLOGY

Through using a survey and semi-structured interviews, both quantitative and qualitative methods are applied in this study in a complementary manner. In the field of IT/IS research, a combined methodology of both quantitative and qualitative analysis has become common and has been found to gain richer information than a single method approach [83].

The quantitative method will utilize a survey questionnaire as its main method of data collection. The questionnaire will be distributed electronically and manually in different cities in Saudi Arabia. The main reason behind the questionnaire being distributed electronically and manually is to get broader and more comprehensive results. It is planned that around 400 responses will be obtained, which will exceed the recommended sample size [84]. The results of the survey will be analyzed and the research model validated using descriptive statistics as well as the structural equation model (SEM) implemented in partial least squares (PLS).

The qualitative part of the research is conducted through a case study, which includes interviews with key officials responsible for e-government and m-government in selected Saudi ministries such as the Ministry of Communications and Information Technology, the Ministry of the Interior and the Ministry of Finance. This will enable the researcher to understand in depth, the factors that impact on the adoption of m-government services from a managerial perspective.

## VI. CONCLUSION

This study aims to investigate and analyze factors that can impact Saudi citizens adoption and use of m-government services in Saudi Arabia. With this in mind, a Mobile Government Adoption and Utilization Model (MGAUM) will be developed as a basis for future work. MGAUM integrates the Technology Acceptance Model with a number of social, cultural and technological factors, taken from other recognized theoretical acceptance models and that have been identified as key factors in the literature. As part of this research project, MGAUM will be tested with Saudi citizens to investigate and understand their perception about mobile government services.

We believe the results of which will provide valuable information about the key factors affecting adoption of m-government services in Saudi Arabia which will be useful for policy makers who wish to employ strategies that would make for faster and more efficient adoption of such services as well as providing useful information for researchers and the ICT industry.

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