

# **The Formulation and Validation of a Conceptual Framework for the Transition from E-government to M-government**

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## **Abstract**

The proliferation of mobile devices has spurred many nations across the globe to make the necessary transition from e-government to m-government to provide better services to their citizens more flexibly, transcending temporal and geographical barriers. However, making such transitions is fraught with numerous challenges that may impede a smooth transition of these services. To make matters worse, there is a lack of conceptual frameworks to which relevant stakeholders can refer. Against this backdrop, this study was carried out to formulate and validate a conceptual framework to guide the transition of services from e-government to m-government in the United Arab Emirates (UAE). This study was based on qualitative approach involving a survey in which 15 academicians from reputable universities in the UAE were selected to seek their opinions on the conceptual framework of the study. The research instrument used in this study constituted a survey questionnaire consisting of two parts. The first part sought to gather personal information of the participating experts, namely gender, age, educational level, working experience, and fields of expertise. The second part aimed to elicit their opinions regarding the appropriateness of five constructs and their components used for the formulation of the conceptual framework of the study, namely IT Infrastructure, IT Skills, Security and Privacy, Knowledge of Operating Standard and Protocols, and Operating Frameworks, each of which was rated along a spectrum of agreement based on 4-point Likert-type scales, ranging from '1' (Strongly Disagree) to '4' (Strongly Agree). This part consisted of 25 items, with each construct being rated by five items. The survey questionnaire was pilot-tested involving four experts in the field of mobile communication. The analysis of experts' opinions were analyzed based on the Fuzzy Delphi Method, showing that IT Infrastructure and Security and Privacy were deemed highly valid, closely followed by the

remaining constructs, namely IT skills, Operational Frameworks, and Knowledge of Standards and Protocols. Likewise, all of their components were also deemed highly valid. The above findings strongly suggest that all the five constructs as well as their components are crucial aspects that may have significant impacts on the transition of services from e-government to m-government in the UAE. From the practical standpoint, the validated conceptual framework help provide a greater insight into the understanding of potential challenges that relevant stakeholders have to face as they embark on making such an ambitious transition. However, more studies are required to examine the usability of the proposed conceptual framework for the transition of services from e-government to m-government from the perspective of practitioners working in the related fields.

**Keywords:** e-government, m-government framework

## **Introduction**

Lately, organizations around the globe has been paying strong emphasis on the efficiency of business transactions, which has been spurred by the rapidly increasing advancements in a wide range of technologies. In particular, the advent of electronic government, also known as e-government, has drastically altered the business realm by employing information and communication technology (ICT) to improve the efficacy of government services of many nations to serve their citizens, employees, businesses, and agencies through web-based internet applications (OECD/International Telecommunication Union, 2011). Around the world, various federal, state, and local governments have applied various e-government initiatives to enable the purchase of goods and services, the delivery of information and forms, and submission of bids and proposals (GAO et al., 2001). These online services offer many benefits to both citizens and governments of many nations. From the public perspective, e-government is an efficient strategy of modernizing information acquisition, thereby reducing the cost of a business transaction. It is also an effective strategy of providing an array of information to citizens and private business ventures through the Internet. From the governmental standpoint, e-government plays a major role in information dissemination for the public, thereby facilitating the implementation of government services, transactions, policies, and resource distributions across agencies which results in agencies experiencing significant cost reductions and improved efficiency, with citizens receiving faster, more convenient services. In recent years, the public, including government employees working in various organizations, have witnessed the proliferation of mobile devices that expedited the transition from e-government to m-government, also known as (Mobile government), as more people are becoming more aware of the importance of m-government, which they can gain access to anytime, anywhere using their mobile devices (Pandey & Sekhar, 2013; Song, 2005).

## Mobile-Government

Essentially, m-government is an extension or evolution of e-government through the utilization of mobile technologies for public service delivery (Oui-Suk, 2010). M-government involves the utilization of different mobile devices, such as Personal Digital Assistants (PDAs), handheld operated devices, smartphones, and cellular phones, to access governmental services. Essentially, M-government has several unique features that can significantly improve the delivery of governmental services, such as providing non-stop, fast, and reliable services throughout the year, adapting to changes quickly, and devising solutions to challenges, and facilitating people's lives.

However, the transition from e-government to m-government has several challenges (Song, 2005; Sharma & Gupta, 2004; Weerakkody et al., 2007), which encompasses both social and technical dimensions, such as people's awareness, the privacy of information, data security, trust, and technology training skills (Abu-Shanab, 2012; Al-Shboul et al., 2014; Qader & Kheder, 2016). In this respect, several researchers have outlined some of the challenges that include cultural, political, structural, legal, social and administrative aspects (Abu-Shanab, 2012; Al-Thunibat et al., 2010; Antovski & Gusev, 2005; El-Kiki & Lawrence, 2007; Fasanghari & Samimi, 2009; Kim et al., 2004; Mukherjee & Biswas, 2005). For example, in Jordan, Aloudat et al. (2014) investigated several challenges and barriers, such as trust information security and privacy concern, which were associated with the adoption and acceptance of m-government.

Like other aspiring nations, the United Arab Emirates has also been compelled to implement m-government to meet its citizens' need for services that are easily accessible anywhere, anytime. In 2015, the two-year deadline imposed by the UAE's government for m-government services to be implemented across all governmental organizations had passed, culminating in a remarkable milestone that witnessed the implementation of its m-government peaking at 96.3%, encompassing 337 important governmental services offered by 41 governmental entities. Admittedly, an implementation rate at 100% would be extremely difficult to achieve due to various challenges. A report published by Telecommunications Regulatory Authority (TRA) - UAE (November 24, 2015) indicated its governmental entities faced several key challenges in implementing m-government services, such as interoperability, integration efficiency, data privacy, security, user-friendly applications, and accessibility.

As highlighted in the above report, in rushing to meet the deadline (in May 2015) set by the UAE's government to transform services from websites to mobile applications, many of its government entities had to face several challenges in ensuring the quality of applications, the security of information as well as the effectiveness of the applications in terms of their usability, which were highly challenging to small entities that typically lacked essential infrastructures and technical skills. As such, an implementation rate at 100% was practically impossible to achieve given such

challenges. The above problem evoked considerable interest that motivated the researchers, who was as a government employee with expertise in communication and computer engineering, to investigate the challenges and barriers faced by most of UAE's governmental entities that hindered a complete transition from e-government to m-government within the given time frame.

This study, therefore, focused on exploring these challenges as well as identifying ways to evaluate a framework for m-government standards, protocols, and opportunities for various business engagements.

Against the backdrop discussed above, three research questions were formulated to guide this research:

What are the challenges faced by various UAE'S governmental and private business organizations in making a smooth transition of services from e-government to m-government?

What will be the appropriate conceptual framework to facilitate the transition of services from e-government to m-government?

What will be the effective method to validate the proposed conceptual framework?

Correspondingly, three research objectives were formulated to address the above research questions:

To identify the challenges faced by UAE'S governmental and private business organizations in making a smooth transition of services from e-government to m-government.

To formulate a conceptual framework to facilitate the transition of services from e-government to m-government.

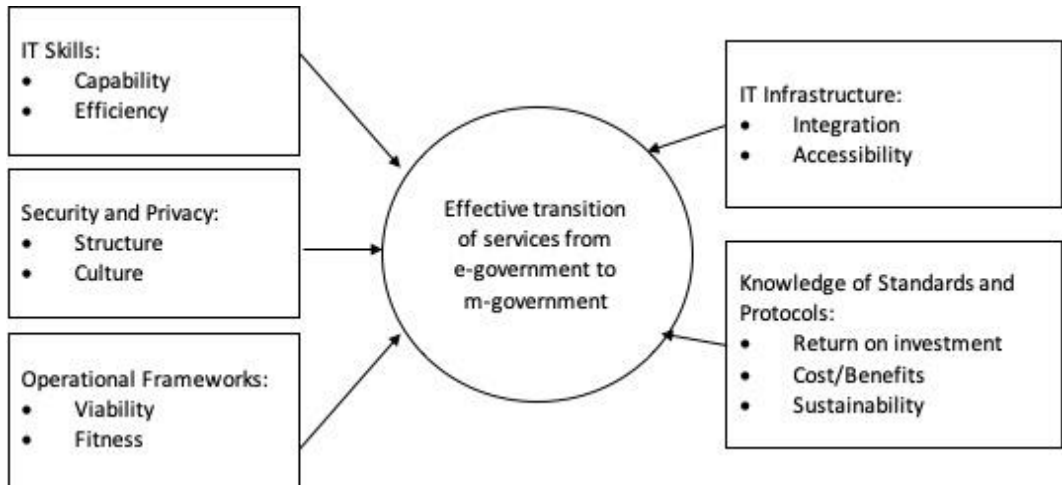
To validate the proposed conceptual framework for the transition of services from e-government to m-government using the Fuzzy Delphi Method.

### **Development of the Conceptual Framework of the Study**

The study employed a systematic review of literature to identify the challenges and opportunities for the transition from e-government to m-government. Specifically, relevant articles published from 2012 to 2017 that were available from several leading electronic digital data bases, namely IEEE Xplore, Science Direct, Scopus, Springer Link, Web of Science, and Google Scholar. This process helped to facilitate the formulation of the conceptual framework of the study regarding the challenges in the transition from e-government to m-government, which led to the identification of five categories of challenges that constituted the study constructs (see Figure 2.3), namely IT Infrastructure (Ndou, 2004; Sharma & Gupta, 2004), IT Skills (Al-Shboul et al., 2014; Tair & Abu-Shanab, 2014), Security and Privacy, Knowledge of Operating Standard and Protocols (Akram & Malik, 2012; Al-Hujran, 2012; Alshehri et al., 2012;

Hung et al., 2013; Shareef et al., 2014), and Operating Frameworks (Qader & Kheder, 2016).

The five categories formed the basis for the formulation of the conceptual framework to highlight the main constructs of the study, which were examined based on the opinions of employees of selected governmental and private organizations in Dubai in the UAE through a survey. Figure 1 shows the proposed conceptual framework of the study consisting of five constructs with several components identified through the literature review.



**Figure 1:** The proposed conceptual framework of the study

## Methodology

### Participants

A total of 15 academicians from several reputable universities in the UAE were selected as the experts, comprising six (6) senior lecturers, three (3) assistant professors, four (4) associate professors, and two (2) professors, whose opinions were sought through a survey to validate the conceptual framework of the study. As stressed by Turoff (2002), a panel consisting of experts from 10 to 50 is deemed suitable to ascertain expert opinions, depending on the available resources. In this study, the experts in the area of the study were scarce, thus the 15 experts selected were considered acceptable. Specifically, they were selected because of their strong knowledge and vast experiences in the mobile and wireless communication technology. Table 1 summarizes the background of the experts selected for the Fuzzy Delphi method.

### Procedure

All the 15 experts were contacted at their respective institutions to elicit their feedback or opinions regarding the appropriateness of the five study constructs that

constituted the conceptual framework of the proposed study. Survey questionnaires and relevant materials were sent to the experts by emails together with a cover letter, informing them the main purpose of the research, detailing the procedure that they were required to follow to answer the survey questions, and thanking them for the participation in the survey. They were given ample time to go through the questionnaires and reminded to submit the filled out questionnaires accordingly based on a given deadline

### **Instrument**

The research instrument used in this study constituted a survey questionnaire consisting of two parts, which was used to gather experts' opinions regarding the framework constructs. The first part sought to gather personal information of the participating experts, namely gender, age, educational level, working experience, and fields of expertise. The second part aimed to elicit their opinions regarding the appropriateness of the five study constructs, namely IT Infrastructure, IT Skills, Security and Privacy, Knowledge of Operating Standard and Protocols, and Operating Frameworks, each of which was rated along a spectrum of agreement based on 4-point Likert-type scales, ranging from '1' (Strongly Disagree) to '4' (Strongly Agree). This part consisted of 25 items, with each construct being rated by five items. The survey questionnaire was pilot-tested involving four experts in the field of mobile communication.

### **Data Analysis and Results**

This section provides a detailed account of the analysis of data undertaken in this study. This section highlights and summarizes the results of both descriptive and inferential statistical analysis. Data were analyzed using the Statistical Package for Social Sciences (SPSS). Table 1 summarizes the demographic backgrounds of the selected experts.

**Table 1:** The demographic backgrounds of the selected experts

Expert #	Job title	Years of experience	Field of expertise
Expert 1	S. Lecturer	5	Web Design
Expert 2	S. Lecturer	5	Web Design
Expert 3	S. Lecturer	7	App. Design and Development
Expert 4	Asst. Prof.	10	Information system
Expert 5	Asst. Prof.	10	Information system

Expert 6	Asst. Prof.	10	Web Design
Expert 7	S. Lecturer	13	Web Design
Expert 8	Prof.	25	Information system
Expert 9	Prof.	22	Information system
Expert 10	S. Lecturer	6	App. Design and Development
Expert 11	S. Lecturer	6	App. Design and Development
Expert 12	Assoc. Prof.	10	Information Technology
Expert 13	Assoc. Prof.	10	Information Technology
Expert 14	Assoc. Prof.	11	App. Design and Development
Expert 15	Assoc. Prof.	12	Mobile Learning

Table 2 shows the results of the internal consistency reliability testing of questionnaire items regarding the five constructs of the study.

**Table 2:** Results of the internal consistency reliability testing

No	Construct	No of Items	Cronbach Alpha
1	IT Infrastructure	5	0.86
2	Security, Trust, and Privacy	5	0.77
3	IT skills	5	0.85
4	Knowledge of Operating Std. and Protocols	5	0.80
5	Operating Frameworks	5	0.79

Table 3 and Table 4 show the results of the Fuzzy Delphi method in terms of triangular fuzzy numbers and defuzzification values of experts' opinions of the five constructs

and their components, respectively, for the transition of services from e-government to m-government in the UAE.

**Table 3:** Experts’ opinions of the constructs of the conceptual framework

Construct	Triangular Fuzzy Numbers		Defuzzication Value	
	Mean threshold value (d)	Mean % of expert consensus	Mean fuzzy score (a)	Result
IT infrastructure	0.2	100%	0.680	Consented
IT skills	0.2	93%	0.680	Consented
Security and Privacy	02	100%	0.680	Consented
Operational frameworks	02	93%	0.680	Consented
Knowledge of Std and Protocols	01	93%	0.680	Consented

**Table 4:** Experts’ opinions of the components of constructs of the conceptual framework

Construct	Triangular Fuzzy Numbers		Defuzzication Value	
	Mean threshold value (d)	Mean % of expert consensus	Mean fuzzy score (a)	Result
Integration	0.2	100%	0.680	Consented
Accessibility	0.2	100%	0.680	Consented



Capability	0.2	100%	0.729	Consented
Efficiency	0.2	100%	0.729	Consented
Structure	0.2	100%	0.693	Consented
Culture	0.2	100%	0.693	Consented
Viability	0.2	100%	0.693	Consented
Fitness	0.2	100%	0.693	Consented
ROI	0.2	93%	0.693	Consented
Sustainability	0.2	93%	0.693	Consented

### Discussion, Conclusion, and Recommendations

As shown in Table 1, the experts were made up of members of academia working in several public universities in the UAE, whose working experiences ranged from 5 to 25 years. In addition, they were vastly experienced in web design, applications design and development, information system, information technology, and mobile learning. These results highlight a strong diversity of the experts in related fields of technology, making their opinions of the study constructs highly reliable. As indicated in Table 2, the computed Cronbach's Alpha values of the questionnaire items ranged from 0.77 to 0.86, which exceeded the recommended value of 0.60, indicating high internal consistency of the scales of the research instrument in measuring the construct.

As indicated in Table 3, the mean percentages of experts' opinions of IT Infrastructure and Security and Privacy were both 100%. The remaining constructs, namely IT skills, Operational Frameworks, and Knowledge of Standards and Protocols attained mean percentages of experts' opinions of 93%. These results suggest that IT Infrastructure and Security and Privacy are extremely crucial to ensuring a successful transition of services from e-government to m-government in the UAE. Additionally, establishing proper infrastructures to handle the required services as well as employing the necessary techniques to safeguard the security and privacy of information are vital for an efficient transition from e-government to m-government (Miller, 2013).

As shown in Table 4, the experts' opinions on the components of IT infrastructure, namely Integration and Accessibility, attained a high level of consent at 100%, signifying that IT infrastructure must have the capacity to support high integration and accessibility to foster efficient maintenance and quality delivery of services to both governmental and private organizations. Likewise, the components of IT Skills,

namely Capability and Efficiency, were deemed highly valid, with each attaining a mean percentage of experts' opinions of 100%. It can be reasonably argued that the availability of capable manpower is necessary for the efficient transition of services from e-government to m-government. In particular, such a transition entails highly capable, efficient professional with good knowledge and vast experiences in handling a wide spectrum of services in governmental and private organizations. Similarly, the components of Security and Privacy, namely Structure and Culture and efficiency, were also rated to be highly valid, as evidenced by their high mean percentages of experts' opinions of 100%. Specifically, this finding indicates that the structure of security measures for safeguarding data and maintaining the privacy of information is a vital component or aspect that needs to be seriously taken into account when making a transition of services from e-government to m-government.

Equally impressive, the components of Operational Framework, namely Viability and Fitness, were strongly accepted by the experts to be valid, with both equally attaining a mean percentage of experts' opinions of 100%. This finding signifies that a viable operational framework is important and crucial to handling the need of variable services. Hence, such an operational framework needs to be fitted with various dimensions of services. With such a framework, as implored by (Kushchu & Kuscu, 2003) governmental organizations can provide users with easy access to data using m-government in several alternative forms, such as voice, text messages, or video calls, to encourage the public to use the services that they offer. Meanwhile, the components of Knowledge of Standards and Protocols, namely Return of Investment and Sustainability, were deemed valid, with each component attaining a mean percentage of experts' opinions of 93%. Even though these components were not as highly rated as other components, there are, nevertheless, can be considered important too. This finding suggests that the return on investment and sustainability are important factors to the implementation of m-government, which can be prohibitively expensive for some nations. Surely, the former is paramount to justifying the cost of such an implementation and the latter to maintaining the operations of m-government on a long term. Thus, careful considerations of these two components must also be factored in making a transition from e-government to m-government.

As discussed, the findings of the validation of the conceptual framework based on the Fuzzy Delphi Method showed that the experts had reached a strong consensus regarding the validity of the five constructs of the study as well as their components, signifying that they are crucial aspects that may have significant impacts on the smooth transition of services from e-government to m-government in the UAE. From the practical standpoint, the validated conceptual framework help provide a greater insight into the understanding of potential challenges that relevant stakeholders have to face as they embark on making such an ambitious transition. Surely, such an understanding can help them become more prepared to deal with such challenges in implementing m-government (Alharmoodi & Lakulu, 2020). Arguably, more studies

are required to examine the usability of the proposed conceptual framework for the transition of services from e-government to m-government from the perspective of practitioners working in the related fields.

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