

# Proposing SMART-Government Model: Theoretical Framework

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## ABSTRACT

*E-Government was defined as the use of information technologies that utilize the internet and mobile computing by government agencies to have the ability to transform relations with citizens. The research problem was focusing on the lack of studies that deals with describing the maturity model to measure smart government, which will be assisting on measuring the quality of smart government, in any country, based on customized quality models. The key objectives of this paper were concerned on the highlighting the needs for proposing a maturity model to rank the smart governments based on the used best practices and standards. For achieving these objectives, the intensive literature review has been conducted by using the descriptive analysis for all academic literature, governmental and non- governmental report and other literature that relates to the Six-Sigma, best practices, and international standard standards. The conclusions of this paper have been reached to the vitality of conducting in deep research to proposing SMART-government maturity model best practices, international standards, and Six-Sigma approach for mastering any E-government models over the world.*

## 1. Introduction

The governments, over the world, trying to utilize information technology such as E-Government and M-Government to improve the service quality by harnessing the Internet and mobile computing by government agencies to transform relationships with citizens, businesses, and other government entities (Alhomod et al., 2012; Isaac, Abdullah, Ramayah, & Mutahar, 2017; Isaac, Abdullah, Ramayah, Mutahar, & Alrajawy, 2017; Isaac, Abdullah, Ramayah, & Mutahar Ahmed, 2017). In addition, e-Government can act as a significant way to use the most innovative of ICT technologies mostly web-based applications with more access to government information. It was a good tool for improving the services quality and for providing democratic institutions and create hopeful opportunities (Fang, 2002; Aldholay, Isaac, Abdullah, & Ramayah, 2018; Mutahar et al., 2018)

The transform relations between citizens and governmental entities have been stronger by using digital means of mobile computing technologies and internet application for businesses and other arms of government. It is the newest thinking of using internet for delivering best services to the citizen (Halachmi, 2004; Isaac, Abdullah, Ramayah, & Mutahar, 2017a; Isaac, Abdullah, Ramayah, & Mutahar, 2017b; Isaac, Masoud, Samad, & Abdullah, 2016). So, the key questions of the research were focusing on the best quality model could be customized to build the proposed smart government maturity model? And, how to propose a new model to measure the quality of smart government based on customized quality model? Research Objectives concerned on building and proposing maturity model to rank the smart governments based on the used best practices and standards, and this will be built using the concepts of Six-Sigma. The main objectives of this research are summarized as the following: To identify the best quality model could be customized to build the proposed smart government maturity model. Significant of study is dwell in benefited that will be gained when built, the proposed Smart Best Practices Government Maturity Model (SGBPMM) could be used

by different countries' government to measure the rank of their smart governments (1 to 5, 1 means the lowest quality of the smart government and 5 means the highest level) and get a set of recommendation to go to the higher rank.

## 2. Research Methodology

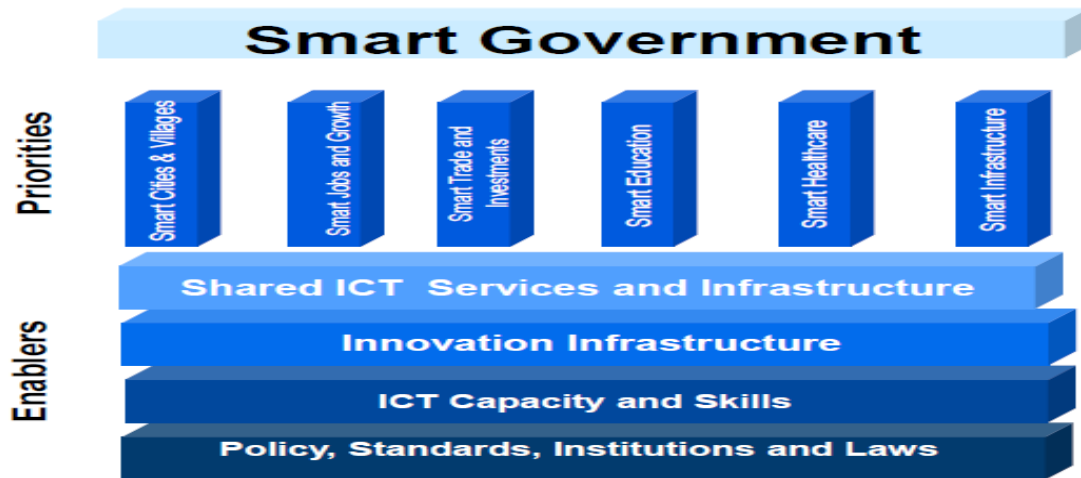
In this paper, the information was collected from written sources and references, which include books, periodicals, magazines, university researchers and thesis documented researches, published or unpublished. As well as the literature reviews that published in local and international websites through educational researches, scientific researches, literary researches, media and journalistic researches, cultural researches and educational related research to achieve the search level in an appropriate theoretical framework with the research problem determining the quality of information that collected (Ameen, Ahmad, & Kamsuriah Ahmad, 2013). For achieving the objectives of the research, a descriptive method is used for collecting the real and detailed information on this subject, and then discussing the theoretical framework of the research topic and analyzing the findings of the previous studies (Ali & Ahmad, 2013; Qais Ahmed Al-Maamari et al., 2018). This has helped in organizing the information and classifying them to reach the results that hoped to contribute to developing the reality which is aimed to study. Despite the research's help to develop the relationship between strategic planning and crisis management and to identify the main obstacles that limit the role of strategic planning in crisis management through recognizing the findings of his researchers in this area and checking the extent of the contribution of the strategic planning in crisis management.

## 3. Literature Review

### 3.1 Concept of Smart Government

The next generation model of ICT-enabled public-sector transformation into a Smart Government. In smart government concept, the '**SMART**' – see figure 1 – stands for (Petrov, 2014):

- **Social:** Not only highly personalized and citizen-friendly service delivery, but also allowing citizens and civil society to co-create with Government, especially via social media and crowdsourcing tools.
- **Mobile:** Using the latest mobile technologies to deliver information and services, and get contributions from citizens, wherever and whenever they want – by Apps, SMS, Social Media, and Web-on-the-move – using mobile networks and cloud computing at the back-end.
- **Analytics:** Using big data Analytics, sensors, and context-aware services to drive policy action and to individualize communications and transactions.
- **Radical-openness:** “Open by Default” and “Open by Design” transforms Accountability and Transparency and engages citizens in co-creation, as well as enable businesses to use data for innovative new services.
- **Trust:** Effective cyber security so that services are resilient, available and protection of privacy.



**Figure 1:** Smart Government Concepts (Petrov, 2014)

The earliest mention of the combined terms of ‘SMART’ and ‘government’ that we were able to find dates to a short World Bank report on civil service reform (Scholl and Scholl, 2014). International Data Corporation (IDC) defines Smart Government as: “*the implementation of a set of business processes and underlying information technology capabilities that enable information to flow seamlessly across government agencies and programs to become intuitive in providing high-quality citizen services across all government programs and activity domains*” (Rubel, 2011).

### 3.2 SMART Government (M-Government)

The use of mobile devices (Mobiles. Tablets, Pads, etc.) is the key point the SMART Government. Thus, many researchers referred to the SMART Government using the ‘m-Government’ term. Despite its early stage, M-Government seems to have a substantial influence on the generation of a set of complex strategies and tools for E-Government efforts and on their roles and functions. The number of people having access to mobile phones internet is growing swiftly. A recent research report shows that there are billions of users who use this technology they are an exponentially in several areas of the world (UN, 2014). Anywhere any time, mobile devices are becoming a natural part of our life, and thus, the governments have started transform their activities according to this demand of convenience and efficiency of interactions for all parties such as governments and citizens (Abd-Elaziz, Aziz, Khalifa, & Abdel-Aleem, 2015; El-hassan, Elsayed, & Soliman, 2015).

In addition, OECD (2011) defines the M-Government as the significantly expanding governments’ capacity through Mobile technology to produce benefits and deliver outcomes for governments, citizens, businesses, and to impact positively national overall economic growth. Benefits are delivered by governments to different stakeholders through the mobile technologies have different models. According to the Organization for Economic Co-operation and Development – OECD (2011), in general, there are four primary delivery models of M-Government, that is:

- 1- M-Government-to-Citizens (mG2C): is referring to the interaction between government and citizens.
- 2- M-Government-to-Government (mG2G): is referring to inter-agency relationships and the interaction between government agencies.
- 3- M-Government-to-Business (mG2B): is describing the interaction of government with businesses
- 4- M-Government-to-Employees (mG2E): is concerning the interaction between government and its employees.

M-Government is not the second stage of E-Government or a complementary to that service. But, it can be considered as a subset of E-Government comprising another channel to provide government information and services (El-Kiki, 2005). Furthermore, this service has its own functionality and features (Goyal and Purohit, 2012). There are several advantages of M-Government over E-Government. On the other hand, some researchers believe that M-Government will not completely replace the E-Government activities, and thus it should be become as complementary to E-Government efforts (Kushchu, I. and Kuscu, 2003; Lallana, 2005; Al-Hadidi, 2010).

Although some researchers studied the adoption of M-Government on the base of E-Government, these studies have limitations. These limitations are derived from the advantages and functionalities of the M-Government over the E-Government. On the other side, the similarities between the two technologies allow the researchers to utilize the E-Government theories and technologies when studying the M-Government. For example, Shareef *et al.* (2012) clarified some of the ambiguities and differences between the E-Government adoption and M-Government adoption. Their study shows that E-Government adoption through the PC-based Internet is mostly limited to educated groups who have self-efficacy in using computers, software, and the Internet. While using mobile devices for any purpose and interacting with government websites to seek service does not require very sophisticated knowledge and skills. As a result, usage and application of mobile phones have become popular among urban, suburban, and rural populations (Abdulbaqi Ameen & Ahmad, 2011; Shareef *et al.*, 2012). Consequently, M-Government policymakers should extend priorities to make government services willingly accessible through mobile devices, and easy to use, simple, and understandable. This is even more important for M-Government than E-Government because a significant segment of M-Government users is typically less educated or have little experience in using modern ICT-based services.

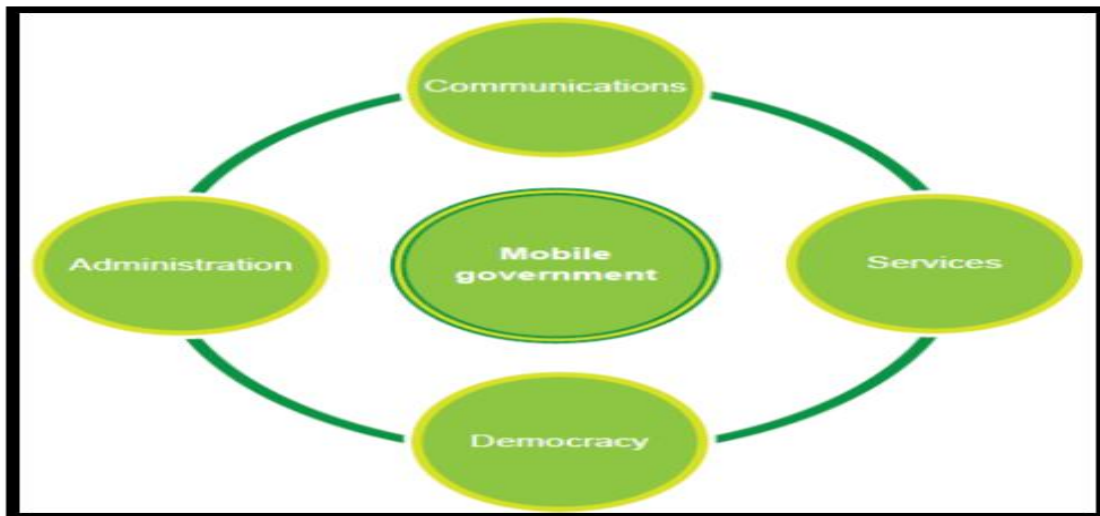
Eoma and Kim (2014) concluded in their analysis that one of the important factors influencing the maturity of public mobile applications is that the government agencies have only followed the trend of the rapid proliferation of public mobile applications without considering how high-level citizen-centric services could be delivered through that public mobile applications. In addition, Wilson (2012) stated that any attempts to implement M-Government should be done through citizen participation.

In Arab countries, M-Government services implementation is still in its very early stages and such services have not been utilized to full extent (Al-Hujran, 2012). The quality and effectiveness of the M-Government services is an important issue in the developing and improving the services provided to the citizens. In addition, the types of such services are very important for the end-users (citizens). To gain such quality and effectiveness of the M-Government services, we need to encourage the citizens to use such e-services and feed us with their feedbacks for improvement and enhancement. Furthermore, it is crucial to persuading the citizens about the benefits which could be earned from such services (El-Kiki and Lawrence, 2006). The effectiveness of M-Government services is discussed by El-Kiki and Lawrence (2006) in their research. They build a conceptual framework of Mobile-users benefits from M-Government services. In this model, they discussed a metric of requirements in any M-Government services that users want to fulfill their needs for E-Government services, as well as achieve their requested tasks from these services. The metric consists of four main categories:

- Value of money,
- The Quality of Daly Service,
- Effective Transaction
- Strategic Data Resources.

These four categories lead to a measurement metric which aims to achieve the satisfaction of customers toward the use of the service (El-Kiki and Lawrence, 2006). As in Figure 2 below, M-Government services can be classified into the following different service types (Jotischky and Nye, 2011):

- 1 **Communications:** The governments can use the Mobile devices to reach their citizens through different types of notifications, for example, using Short Message Service (SMS) alerts or social media channels to reach the citizens for tax renewals, passport renewals, etc.
- 2 **Services:** Some transactions such as payment of fines, public sector employee wages, public transportation ticketing, etc. can be done using Mobile devices via SMS or mobile application.
- 3 **Democracy:** Mobile devices can be used as a supporter of the democracy by allowing the citizens to input to political decision-making, such as contact with their local political representatives and electronic voting.
- 4 **Administration:** Improving the internal operations and communications between the agencies within the same government and create a more integrated platform for all public-sector employees, whether the required data is available on the Internet, network, or even portable device. The potential use of administration includes telemedicine, handling of citizen complaints, the monitoring of public works, etc.



**Figure 2:** M-Government Services Categories (Jotischky and Nye, 2011)

M-Government services are utilized in different activities. For examples, it can be used in the public health, public education, public transportation, democratic participation, social services, business support, and many other activities (Goyal and Purohit, 2012). M-Government services are not yet very well proliferated in the whole world. Trimi and Sheng (2008) introduced some implementations of the M-Government services in different developed countries and classified these applications into two categories:

- G2C (M-Government to- Citizen), and
- IEE (Internal Efficiency and Effectiveness).

The previous discussed M-Government services could be implemented through what is called Mobile Applications which are software applications dedicated completely to be executed and work under the mobile operating systems (for example, IOS from Apple, Android from Google, windows mobile from Microsoft, Blackberry, and Symbian from Nokia). Table 1 below gives some examples of the G2C M-Government services in different developed countries.

### 3.3 Best practice

In this subsection, the e-government best practices will be discussed. However, these best practices will be classified later to know which of them is related to the SMART Government. The growth and need of e-government based on the best practices that influence e-government portals in determining a broader understanding of what contributes to their quality. This section provides a general overview of the e-government best practices collected from research and industry and classifies these best practices into four categories, that is, back-end, front-end.

Category	Service	Country	Description
Application	Tracking Election Returns	USA	Allow individuals to track election returns for statewide races on the election night.
	Mobile Tracking Systems	UK	- Track London buses using mobile communication systems. - Send messages to control traffic flow.
	Mobile Parking Fees Payment	Sweden	Allow citizens to pay parking fee through mobile devices.
	ID Sim	Finland	ID cards that serve as an official travel document as a passport does.
	SMS Alerting Services	Hong Kong	Text messages to mobile phone users.
	SMS Notifications	Singapore	- Parking ticket reminders. - National service obligations. - Passport renewal notification.
IEE	Police Applications	USA	- Check vehicle registration. - Access warrant information, crime database. - Issue tickets. - Automatic traffic citation. - Traffic-video feeds.
	Tracking Suspect	Germany	Use GPS and mobile phones to track suspects' movements.
	Parking	Austria	Use handheld devices to connect to central database to monitor parking.
	MPolice	Korea	Police officers retrieve information using mobile devices and print tickets on the spot.
	Parking Enforcement	Korea	Parking inspectors collect parking lot information using PDAs, and print receipts on the spot
	M-Local Tax Management System	Korea	Allow officers to access tax information on the spot Transfer the data to the local tax database

Table 1: Examples of G2C M-Government services in different developed countries (Trimi and Sheng, 2008)

### 3.4 International standards

Many organizations are developing standards for software engineering; for example, the European Space Agency (ESA), the Institute of Electrical and Electronic Engineers (IEEE), the American National Standards Institute (ANSI), and the International Organization for Standardization (ISO). The ISO organization represents the international consensus and agreement from several member countries from around the world. Many of these countries might participate in the editing process of the standards and they must participate in the ballot at each stage of the standards development.

A 'standard' may be defined as an agreement between a number of - not necessarily all - players within a certain area of technology. The word 'standard' is only used in cases where recognition has been granted by one or more standardization bodies.

Schmidt (2000) has summarized the following benefits of the use of the software engineering standards:

1. Help in achieving greater conformance to software requirements, reduce the number of software defects, mitigate risks associated with the software, and decrease software maintenance costs.
2. Provide a framework for systematic, incremental software process improvements, and help to reduce the number of defects introduced during early project phases. This reduces the cost and schedule of the testing, installation, and maintenance phases.
3. Help in satisfying governmental regulations and industry quality standards as they relate to software and is essential for passing audits and achieving certification. The need to achieve compliance is a hard business reality for companies in several industries.
4. Provide enhanced accuracy of project planning, detailed means of tracking projects, early measures of software quality, and improved repeatability of success stories.

### 3.5 ISO 9126: software product quality

In 1991, the ISO published its first international consensus on the terminology for the quality characteristics for software product evaluation. This standard was called Software Product Evaluation – Quality Characteristics and Guidelines for Their Use (ISO, 1991). From 2001 to 2004, the ISO published an expanded version, containing both the ISO quality models and the inventories of proposed measures for these models. The current version of the ISO 9126 series now consists of one International Standard and three Technical reports.

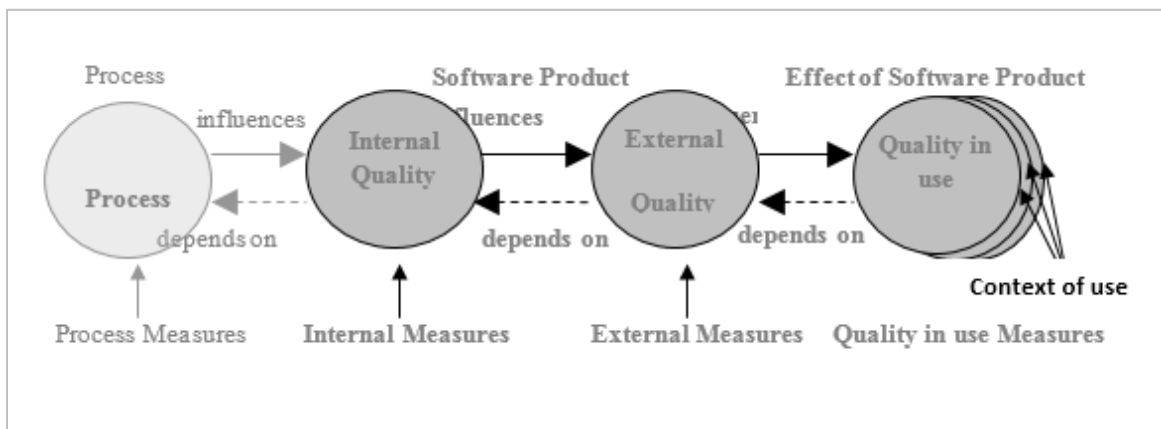
1. ISO 9126 – Part 1: Quality Model (ISO, 2001).
2. ISO TR 9126 – Part 2: External Measures (ISO, 2003a).
3. ISO TR 9126 – Part 3: Internal Measures (ISO, 2003b).
4. ISO TR 9126 – Part 4: Quality in-Use Measures (ISO, 2004).

Within ISO 9126, there are six quality characteristics and twenty-seven quality sub-characteristics for the internal and external software product, and four quality characteristics for the in-use software product. For each of these sub-characteristics (and characteristics in the case of quality in-use), there are several measures that could be used to assess and evaluate software product quality from different viewpoints (e.g. internal functionality, external efficiency, in-use productivity, etc.).

The first part of ISO 9126 (ISO, 2001) describes in some details a software product quality model which should be used with the other three parts. It is defined as a framework which explains the relationship between different approaches to quality (ISO, 2001), and considers software product quality from three distinct viewpoints (stages); that is, internal quality, external quality and quality in-use:

- Internal quality is “the totality of the characteristics of the software product from an internal view” (ISO, 2001, p. 5). It can be realized by measuring the internal properties of the software product without executing it.
- External quality is “the totality of the characteristics of the software product from an external view” (ISO, 2001, p. 5) that is, measuring the external quality properties of the software product during its execution.
- Quality in-use is “the user’s view of the quality of the software product when it is used in a specific environment and a specific context of use” (ISO, 2001, p. 5). It is related to the quality of the in-use software product, that is, during the operation and maintenance phases.

Figure 4 shows the ISO view of the expected relationships between internal quality, external quality and quality in-use attributes. The internal quality attributes influence the external quality attributes, while the external attributes influence the quality in-use attributes. Furthermore, quality in-use depends on external quality, while the external quality depends on the internal quality (ISO, 2001).



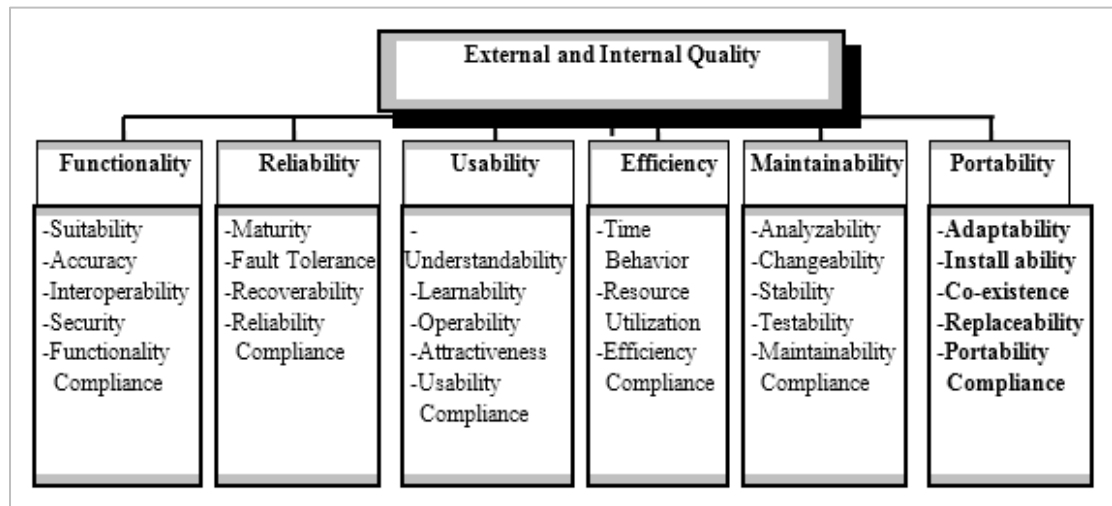
**Figure 4:** Quality in the life-cycle (ISO, 2001)

Moreover, this document (ISO 9126-1) – Quality Model – contains a two-part quality model for software product quality (ISO, 2001), that is:

1. Internal and external quality model;
2. Quality in-use model.

The first part of the two-part quality model determines six characteristics in which they are subdivided into twenty-seven sub-characteristics for internal and external quality, as in Figure 5 (ISO, 2001). These sub-characteristics are a result of internal software attributes and are noticeable externally when the software is used as a part of a computer system. The second part of the two-part model indicates four quality in-use characteristics, as in Figure 6 (ISO, 2001).





**Figure 5:** ISO 9126 quality model for external and internal quality (characteristics and sub-characteristics) (ISO, 2001)

#### 4. Implications

Since the smart government is one of most five components of national strategy in the United Arab Emirates, it is expected that the data resulting from this research will serve as a guideline for policymakers to develop efficient and effective plans to improve the performance of smart government. In the public service context, it will determine the areas where the management must focus on IS tools which will eventually lead to higher student enrolment, address the lack of infrastructure, and improve the quality of services outcomes. It also contributes to the E-Government Model by examining and extending it in the context of UAE's public services, specifically to enhance organizational performance through the implementation of online serves. This study also contributes to theoretical modeling by modifying the maturity model based on the best practices theories in relation to a new application area that may be given new insights into the theory. It is also hoped that this study will lead to a successful adoption of online services supported by new technologies as it discusses factors inhibiting or facilitating this for developing nations in general, and for the Arab countries which share a similar culture, religion and speak the same language (Salmeen Al-Obthani & Abdulbaqi Ameen, 2018).

#### 5. LIMITATIONS AND SUGGESTIONS FOR FUTURE WORK

This research population is limited to the public sector in UAE and will not include academic staff. It will be conducted through a survey questionnaire and therefore no qualitative perspective will be considered. Given the fact that technology has and will continue to rapidly change and result in significant technology advancements in the future (Hayati & Hashemy, 2013), the findings of this research will need to be used with care. Investigating how technological changes may influence Smart Government services towards using stander model as a clear avenue for future research. Accordingly, the focus of this proposal will be on the Government-to-Citizen (G2C) type of e-governments. This research will be satisfactorily fulfilling the public needs and their expectations in the front office and at the same time simplifying their interaction with online services. It will also contribute in the support and simplify governance for the citizen, government, and business by connecting all the parties and support processes and activities (Moon, 2002; Kumar *et al.*, 2007).

#### 6. CONCLUSION

The conclusions of this paper have been reached to the vitality of conducting in deep research to proposing SMART-government maturity model best practices, international standards, and Six-Sigma approach for mastering any E-government models over the world. The intensive study found the need to conducting more research for identifying the underlying factors that control the measurement model and examine the interrelationship between this component (Mutahar, Daud, Ramayah, Putit, & Isaac, 2018;

Alrajawy, Daud, Isaac, & Mutahar, 2017). The findings of this study can be used as a guideline for the strategies and policies makers to established to enable the availability of information technology that assisted in the important role of compatibility and the ability of new technology to solve the many problems facing the countries, and thus encourage and support the execution of the nation master plan at both organizational and national level. Moreover, according to The Global Competitiveness Report (2017), The most competitive economy in this group, the United Arab Emirates, is also the most diversified and has made great strides toward improving technological readiness and innovation since 2011. This indicates that UAE most urgently needs to add advantage by adopting Smart Government.

## REFERENCES

- Al-Hadidi, A. (2010). *Exploratory Study on Adoption and Diffusion of M-Government Services in the Sultanate of Oman*. PhD Thesis, Cardiff, United Kingdom: Cardiff University.
- Al-Hujran, O. (2012). Toward the Utilization of M-Government Services in Developing Countries: A Qualitative Investigation. *International Journal of Business and Social Science*, 3(5), pp. 155-160.
- Aldholay, A. H., Isaac, O., Abdullah, Z., & Ramayah, T. (2018). The role of transformational leadership as a mediating variable in DeLone and McLean information system success model : The context of online learning usage in Yemen. *Telematics and Informatics*, 1(1), 1–17. <http://doi.org/10.1016/j.tele.2018.03.012>
- Alrajawy, I., Daud, N. M., Isaac, O., & Mutahar, A. M. (2017). Examine Factors Influencing the Intention to use Mobile Learning in Yemen Public Universities. *Asian Journal of Information Technology*, 16(2), 287–297. <http://doi.org/10.3923/ajit.2017.287.297>
- Ameen, A. A. B., Ahmad, K., & Kamsuriah Ahmad. (2013). A Conceptual Framework of Financial Information Systems to Reduce Corruption. *Journal of Theoretical and Applied Information Technology*, 54(1), 59–72.
- Ali, A. A. A., & Ahmad, K. (2013). Proposing Strategy for Utilizing Financial Information Systems in Reducing Corruption. In *3rd International Conference on Research and Innovation in Information Systems – 2013 (ICRIIS'13)* (Vol. 2013, pp. 75–80).
- Ameen, A. A. B., Ahmad, K., & Kamsuriah Ahmad. (2013). A Conceptual Framework of Financial Information Systems to Reduce Corruption. *Journal of Theoretical and Applied Information Technology*, 54(1), 59–72.
- Abdulbaqi Ameen, A., & Ahmad, K. (2011). The role of Finance Information Systems in anti financial corruptions: A theoretical review. In *2011 International Conference on Research and Innovation in Information Systems, ICRIIS'11* (pp. 1–6). Ieee. <http://doi.org/10.1109/ICRIIS.2011.6125725>
- Alhomod, S. M.; Shafi, M. M.; Kousarrizi, M. N.; Seiti, F.; Teshnehlab, M.; Susanto, H.; Almunawar, M. N.; Tuan, Y. C.; Aksoy, M. S.; and Batawi, Y. A. (2012). Best Practices in E government: A review of Some Innovative Models Proposed in Different Countries. *International Journal of Electrical & Computer Sciences*, Vol. 12, No. 01, pp. 1-6.
- Hayati, D., & Hashemy, S. A. (2013). Communication Technologies and Virtual Learning Environment (VLE) in Teaching Literature. *International Journal of Innovation, Management and Technology*, 4(2), 181. <http://doi.org/10.7763/IJIMT.2013.V4.387>
- Abd-Elaziz, M. E., Aziz, W. M., Khalifa, G. S., & Abdel-Aleem, M. (2015). Determinants of Electronic word of mouth (EWOM) influence on hotel customers' purchasing decision. *Journal of Faculty of Tourism and Hotels, Fayoum University*, 9(2/2), 194–223.
- Aldholay, A. H., Isaac, O., Abdullah, Z., & Ramayah, T. (2018). The role of transformational leadership as a mediating variable in DeLone and McLean information system success model : The context of online learning usage in Yemen. *Telematics and Informatics*, 1(1), 1–17. <http://doi.org/10.1016/j.tele.2018.03.012>
- El-hassan, A. E. A., Elsayed, Y., & Soliman, D. (2015). Job Satisfaction and Generational Differences: Luxor Hotel Employees Case Study, *14*(1), 1–30.
- Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2017). Internet usage, user satisfaction, task-technology fit, and performance impact among public sector employees in Yemen. *International Journal of Information and Learning Technology*, 34(3), 210–241. <http://doi.org/10.1108/IJILT-11-2016-0051>

- Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2017a). Internet Usage and Net Benefit among Employees Within Government Institutions in Yemen: An Extension of Delone and Mclean Information Systems Success Model (DMISM) with Task-Technology Fit. *International Journal of Soft Computing*, 12(3), 178–198. <http://doi.org/10.3923/ijscmp.2017.178.198>
- Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2017b). Internet Usage within Government Institutions in Yemen: An Extended Technology Acceptance Model (TAM) with Internet Self-Efficacy and Performance Impact. *Science International*, 29(4), 737–747.
- Isaac, O., Abdullah, Z., Ramayah, T., Mutahar, A. M., & Alrajawy, I. (2017). Towards a Better Understanding of Internet Technology Usage by Yemeni Employees in the Public Sector: An Extension of the Task-Technology Fit (TTF) Model. *Research Journal of Applied Sciences*, 12(2), 205–223. <http://doi.org/10.3923/rjasci.2017.205.223>
- Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar Ahmed, M. (2017). Examining the Relationship Between Overall Quality, User Satisfaction and Internet Usage: An Integrated Individual, Technological, Organizational and Social Perspective. *Asian Journal of Information Technology*, 16(1), 100–124. <http://doi.org/10.3923/ajit.2017.100.124>
- Isaac, O., Masoud, Y., Samad, S., & Abdullah, Z. (2016). The mediating effect of strategic implementation between strategy formulation and organizational performance within government institutions in Yemen. *Research Journal of Applied Sciences*, 11(10), 1002–1013. <http://doi.org/10.3923/rjasci.2016.1002.1013>
- Mutahar, A. M., Daud, N. M., Thurasamy, R., Isaac, O., & Abdulsalam, R. (2018). The Mediating of Perceived Usefulness and Perceived Ease of Use : The Case of Mobile Banking in Yemen. *International Journal of Technology Diffusion*, 9(2), 21–40. <http://doi.org/10.4018/IJTD.2018040102>
- El-Kiki, T.; Lawrence, E.; and Steele, R. (2005). A Management Framework for Mobile Government Services. In *Proceedings of the COLLECTeR Conference*, Sydney, Australia, pp.122-126.
- El-Kiki, T. and Lawrence, E. (2006). Mobile User Satisfaction and Usage Analysis Model of mGovernment Services. In *Proceedings of the 2nd European Conference on Mobile Government (Euro-mGov'06)*. Brighton, UK, pp 91-102.
- Eoma, S.-J. and Kim, J. H. (2014). The adoption of public smartphone applications in Korea: Empirical analysis on maturity level and influential factors. *Government Information Quarterly*, 31, pp. S26–S36.
- Fang, Z. (2002). E-Government in Digital Era: Concept, Practice, and Development. *International Journal of the Computer, the Internet and Management*, Vol. 10, No.2, p 1-22.
- Qais Ahmed Al-Maamari, Rezian-na Muhammed Kassim, Valliappan Raju, Ali Al-Tahitah, Ali Abdulbaqi Ameen, Mohammed Abdulrab, ... Abdulrab, M. (2018). Factors Affecting Individual Readiness for Change: A Conceptual Framework, 2(1), 13–18. Retrieved from <http://www.ijmhs.org/index.aspx>
- Salmeen Al-Obthani, F., & Abdulbaqi Ameen, A. (2018). TOWARDS CUSTOMIZED SMART GOVERNMENT QUALITY MODEL. *International Journal of Software Engineering & Applications (IJSEA)*, 9(2), 41–49. <http://doi.org/10.5121/ijsea.2018.9204>
- The Global Competitiveness Report. (2017). *The Global Competitiveness Report 2016–2017*. World Economic Forum.
- Goyal, E. and Purohit, S. (2012). Emergence of M-Government: The Way Forward. *SIES Journal of Management*. 8 (1), pp. 56-65.
- Halachmi, A. (2004). E-Government Theory and Practice: The Evidence from Tennessee (USA), in Holzer et.al (Eds.), *Frontiers of Public Administration*., p. 24-36.
- ISO. (1991). *Software Product Evaluation - Quality Characteristics and Guidelines for their Use*. ISO/IEC IS 9126, Geneva (Switzerland): International Organization for Standardization.
- ISO. (2001). *Software Engineering - Product Quality - Part 1: Quality Model*. ISO/IEC 9126-1, Geneva (Switzerland): International Organization for Standardization, 25 p.

- ISO, (2002), *ISO/TR 16982 Ergonomics of Human System Interaction: Usability Methods Supporting Human Centered design*, International Organization for Standardization. Geneva, Switzerland.
- ISO. (2003a). *Software Engineering - Product Quality - Part 2: External Metrics. ISO/IEC TR 9126-2*, Geneva (Switzerland): International Organization for Standardization, 86 p.
- ISO. (2003b). *Software Engineering - Product Quality - Part 3: Internal Metrics. ISO/IEC TR 9126-3*, Geneva (Switzerland): International Organization for Standardization, 62 p.
- ISO. (2004). *Software Engineering - Product Quality - Part 4: Quality in Use Metrics. ISO/IEC TR 9126-4*, Geneva (Switzerland): International Organization for Standardization, 59 p.
- Jotischky, N. and Nye, S. (2011). *Mobilizing public services in Africa: The M-Government Challenge*. London: Informa Telecoms & Media.
- Kumar, V.; Mukerji, B.; Butt, I.; and Persaud, A. (2007). Factors for successful e-Government Adoption: a Conceptual Framework. *Electronic Journal of E-Government*, Vol. 5, No. 1, pp. 63-76.
- Lallana, E. (2004). *M-Government: Mobile/Wireless Applications in Government*. <http://www.egov4dev.org/topic4.htm>. [Accessed: September 24, 2014].
- Moon, M. J. (2002). The Evolution of E-Government among Municipalities: Rhetoric or Reality? *Public Administration Review*, Vol. 62, No. 4, pp. 424-433.
- OECD. (2011). 'Chapter 2: Benefits and outcomes of m-government'. In: *M-Government: Mobile Technologies for Responsive Governments and Connected Societies*. Paris: OECD Publishing. [Online] <https://www.itu.int/ITU-D/cyb/app/docs/m-ov/Benefits%20and%20outcomes%20of%20M-government.Pdf>. [Accessed: September 24, 2014].
- Petrov, O. (2014). Open Data as a Key Enabler of Smart Government. *The 17<sup>th</sup> National Conference on e-Governance*, January 30, Kochi, India.
- PLAIN, (2014). *What is Plain Language?* Plain Language Action and Information Network, Retrieved June 2, 2014, from <http://www.plainlanguage.gov/whatisPL/>
- Rubel, T. (2011). Smart Government: Creating More Effective Information and Services. IDC Government Insights, *Government Information and Services Survey*, 2011
- Scholl, H. J., & Scholl, M. C. (2014). Smart Governance: A Roadmap for Research and Practice. In *Proceedings of the iConference*, March 4-7, Berlin, Germany pp. 163-176.
- Shareef, M. A.; Archer, N.; and Dwivedi, Y. K. (2012). Examining Adoption Behavior of Mobile Government. *The Journal of Computer Information Systems*, 53(2), pp. 39-49.
- Wilson, F. (2012). *User Requirements Framework for Mobile Government in the Western Cape*. MSc Thesis, Port Elizabeth, South Africa: Nelson Mandela Metropolitan University.