Mobile government service- A disruption to the governance mechanism

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ABSTRACT

Governments all over the world have long been adopted technology to deliver their services to their citizen, however, the process has been accelerated with the recent advent of COVID-19. The ubiquitous nature of mobile technology is making it a preferred source of delivering governmental service. These services are named as "m-government" services and traditionally been placed as a type of e-government service. Because of the impact which these services are having upon general public, it is important to fully understand the definition of m-government services. The current paper tries to arg`ue upon the features and nature of m-government services. It challenges the idea that m-government is a subset of e-government services. After a thorough literature review, examination of various definitions provided by researchers, evaluating its features and comparison of these with e-government services, it was concluded that m-government service is a superset of e-government service. The features of m-government services were also evaluated using theory of disruptive technologies. This has led to establishing the fact that m-government service is a disruptive technology. And a new definition of m-government services was proposed.

INTRODUCTION

Democracy demands that governmental policies should be built according to the needs of public reflecting thought process of the society (1). Technology has helped government evolve. It has provided opportunities to communicate in real-time with the stakeholders. Technology has further contributed in making the feedback process simpler, convenient and cost effective (2). United nation promotes good governance calling it the key to eradicate

poverty. Information and communication technology (ICT) is an effective medium to deliver good governance (3).A paper presented to the 15th session of Committee of Experts on Public Administration, United Nations Economic and Social Council, discussed necessary principles for the administration of public space. It argued that openness, decision making using consultative process, means to prevent corruption, administration of justice and enabling legal framework are keys to sustainable development. Technology was elaborated as a medium which can help in applying these principles judiciously. (4). E-government is a term coined to define all governmental initiatives being delivered using ICT. A report published in 2003 by Organization of Economic Coordination and Development (OECD) has emphasized a holistic approach of adoption of e-government. It emphasizes upon creating enabling environment to achieve the benefits of e-government (5)

OECD has recommended adoption of E-government by enumerating its advantages. It states that ICT helps improvement in efficient discharge of services through providing ease in data collecting, processing and dissemination of information within and between governments. It argues that e-government assists in better service delivery by providing the opportunity to relieve a citizen from knowing difficult government processes and help in getting a better service experience. It further elaborates that sharing of information available at electronic platforms may help making policy decisions easier and quicker. Thus e-government has the potential to become an agent of change for a better tomorrow (5). E-government has the potential to empower individual citizens. It provides them with an alternative channel for interaction with government. It gives choice to the citizen to become an active participant in the governing process rather than remaining a silent observer (6).

Electronic platforms and introduction of Mobile technologies have revolutionized the way governments are being run. E-government provides the opportunity to the developing nations to circumvent the journey of progress. It provides them the chance to develop themselves in relatively shorter span of time (7). Accessing e-government services requires some basic infrastructure like electricity, computer and internet. The supply of electricity in developing countries is not dependable. On the top of this accessing these services are expensive for a common citizen. Accessing e-government services also requires some basic level of computer literacy (8). The advent of mobile technologies and their ubiquitous nature provided another opportunity to governments for reaching out to general public. It provides a platform well understood, affordable, accessible and socially acceptable by all segments of society. Therefore, many governmental institutions, taking advantages of the facilities provided by mobile networks, offered mobile based solutions to accessing their services. Since these solutions were mostly extensions of e-government services providing mobile platforms for already launched e-government initiatives. Therefore, researchers have started treating such services as another form of e-government initiatives.

This lead researchers refer mobile Government as a form of e-government. According to the researchers, mobile government is a type of e-government which provides the opportunity of accessing government services to both the government officials and ordinary citizens at a place and time of their choice (9). However, later on the researchers started recognizing it as a separate field. Researchers (10) identified that it is the complexity of e-government systems which has forced governments to start seeking alternatives like m-government services. This was an opinion which was in contrast to that of other researchers, who have identified m-government systems as another form of e-government instead of being an alternative to it (9).

Researchers (10) further elaborated that a large proportion of public is not prepared to deal with the requirements of e-government initiatives. E-government systems do not only need the hardware, but also require the user to be fully conversant with the usage of computer-based technology (8). Diffusion of mobile devices and the easy availability of cheap mobile telecommunication infrastructure have provided the governments with the opportunity to overcome the barriers of e-government by switching over to m-government solutions (10). High penetration of Mobile phones and availability of mobile networks makes them a good medium to communicate. It may also overcome handicaps associated with the traditional e-governmental platforms especially those related to uninterrupted electrical supply, connectivity and the availability of computer. According to a report published by the International Telecommunication Union, mobile networks cover more than 95% of the world population (11). Moreover, the broadband services provided by the mobile networks are now more affordable then the fixed broadband (12). The wide ranging and universal nature of mobile devices, their wide-spread usage stimulated by increased coverage, cheaper devices, lower tariffs and higher cellular literacy make mobile phones an excellent platform for delivering governmental services. Mobile government provides the general public opportunity to save time, effort and money by accessing government through their mobile devices. It makes government more accessible to the general public especially for those who live in the areas where the relevant governmental offices are not located (13).

The recent successful usage of m-government services in the fight against Covid-19 has proven to be of utmost importance. Government have used mobile networks from dissemination of information (14) to location-based contact tracing services (14, 15). This has provided useful and trustworthy information regarding the spread of disease to public. Moreover, such initiatives also have helped empowering citizens to making choices regarding their movements so to avoid areas having an outburst of Covid-19. These applications have proven to be amongst the most important and cost-effective tools to fight against Covid-19. Success of these application further provides an insight about the horizon of possibilities which the universal acceptance of m-government services may open up.

There are variety of factors which affect usage of mobile platforms for availing governmental services. Policymakers need to identify all the challenges which citizens face in their efforts to increase usage of mobile platforms. Convenience, Trust, Security and Privacy are some of the most important factors affecting usage. Interestingly, these factors do not affect the level of usage in a similar manner. Rather, these factors affect differently in different countries. Location tracing applications used to fight Covid-19 have raised lot of privacy concerns from the citizen forums (15). These potentially work as barriers impeding m-service usage as they prevent users from trusting and therefore becomes a reason for people avoiding government services using electronic platform (3). Lack of training, e-illiteracy and accessibility remain major barriers to the adaptability of mobile and electronic platforms. Governments need to win trust of citizens while ensuring privacy and security of the online transactions (16).

However, here another point needs to be questioned whether m-government should be taken as a part of e-government system or should it be considered an independent initiative. Researchers seems to have contradictory views upon the topic. Authors have suggested models for acceptance of m-government services (13, 17, 18) visibly different from those models (19) which are reviewed and well accepted for acceptance of e-government services. This raises a question that if m-government is a type of e-government then why it needs to be evaluated on a different paradigm for its acceptance amongst users? In fact few authors (19) have raised this point stating differences in acceptance behavior between both platforms of e-government and m-government. Authors have stated that m-governments have created "channels" which are not

available in e-government services. Moreover, these channels requirements are entirely different to tackle with the standard e-government standard operating procedures. Thus creating a necessity to study adoption behavior of m-government services separately from e-government services. The fact is that authors (19) while defining m-government as a subset of e-government have contradicted themselves. At one hand these authors defined m-government as a subset of e-government and on the other hand they claimed these to be different where the m-government behavior cannot be encompassed by theories offered to explain acceptance behavior of e-government services.

When it comes to m-government services this denial of facts seems very common. Researchers world over first try defining m-government as kind of a branch (20)., extension (21), domain (22) or subset (10, 19, 23) of e-government services. However, after giving such a verdict, mostly researchers (19) somehow or other within their arguments confused the subject by making further statements which contradict their claims. Like authors (19) first explained m-government as subset of e-government and then clarified that there are features of m-government services which cannot be encompassed in e-government services. This is in contradiction to the basic definition of a subset. This further calls for an effort to clearly understand the working of m-government services. This further requires authors to review what characteristics an initiative should have to come under the broad definition of m-government services. Moreover, it requires to build an understanding about the differences between e-government and m-government services. To top it all, thus further calls for a comprehensive definition of m-government services.

PURPOSE OF THE STUDY

The current study is an effort towards understanding m-government. This study aims to evaluate different definitions of m-government as provided by the researchers around the globe and then try understanding the role and function of m-government services. The fact is that it is the definition of a subject upon which the body of knowledge of the entire subject is built. M-government services are gaining popularity. Especially the recent epidemic has added fire to the fuel. Increasing the need of the m-government services by leaps and bounds. Mobile based technologies backed by deep learning and artificial intelligence have started proving not only their efficacy but also are providing the road map on handling such large scale epidemics in the future (24). Therefore it's important that we reconsider the definition of m-government in order to understand the subject in detail. So not only the future researchers could correctly comprehend the subject but also the research developed could rightly guide governmental functionaries while designing m-government systems. A design mistake of an m-government system can not only cost national exchequer substantially but may also deprive public from a great service initiative. Moreover, in order to understand the subject further, the current study undertakes an effort to evaluate the m-government service as a disruptive innovation. Evaluating and categorizing m-government service as disruptive innovation may help understand it better while adding dimensions to the subject which previously were reserved for services related to the disruptive innovation only

UNDERSTANDING AND DEFINING E-GOVERNMENT

The advent of information technology has positively affected global efforts of improving public administration. Information technology is used as a medium to transform governance and public services delivery. In today's age of information, ICT is being used as a catalyst of change.(25).

Use of ICT in completing the governmental tasks is e-government. (5). While reviewing the literature one can find variety of e-government definitions each one emphasizing some very important aspects of e-government. The United Nations on its website explains e-government entailing all the services provided by the government online. It could range from mere communication or dissemination of information electronically or digital facilitation of citizens, businesses or governmental organization. The role of e-government has evolved from a medium of communication to usage of ICT-based solution to improve governance, enhancing citizen's interaction and enabling open governments. UN therefore defines e-government as "the use of ICTs to more effectively and efficiently deliver government services to citizens and businesses. It is the application of ICT in government operations, achieving public ends by digital means". UN while explaining values behind e-government suggests that the e-government mechanisms should bring efficiency by decreasing costs and increasing efficiency. A comprehensive e-government policy should be adapted across the board. The objective should be to share information and work processes amongst different governmental agencies so to conserve resources while adding sustainability. UN claims that by utilizing e-government while restructuring work processes, governments can become more efficient, reducing the completion time of tasks and improving the quality of services. E-government also helps bringing in transparency, accountability and trust of public upon the governance mechanism (26).

Researchers have defined e-government as an opportunity to access government using various mediums of electronic communications. It is a way government make arrangement to serve all its stakeholders using ICT. It includes management, procedures, protocols and regulations required for delivering services (27).

M-GOVERNMENT – DEVELOPMENT, EVOLUTION AND APPLICATION

Progress made in information technologies have opened avenues for providing access and governmental services to the general public. Development of mobile technologies have opened further opportunities. In order to harness the dividends of mobile technologies governments are encouraging usage of mobile government services (13). M-government is an alternative delivery channel of the governmental services. Using Mobile technology, governments not only achieve sustainable development goals, but also can help establishing two ways communications between the governments and general public. Mobile government platforms make accessing governmental services easier for the general public; Whereas, at the same moment, it helps governments in delivering public services effectively and efficiently (28).

M-government is derived from e-government. In fact few authors have presented e-government as the superset of m-government (10, 23). However, to many researchers the ability of using mobile networks makes mobile government services a step ahead of e-government services. Higher penetration rate of mobile networks, in comparison to fixed line internet, amongst general public makes it a medium of choice for developing a communication channel between government and general public. (23). This provides governments with the opportunity of reaching out to a higher proportion of population especially to those located at geographically challenged places. Moreover, the mobile nature of m-government applications also makes them a useful tool in case of emergencies and natural disasters (10). The ubiquitous nature of mobile communications and handsets has evolved e-governments into m-governments. (29).

Mobile technology is used by authorities in several countries from African and South Asian regions for implementing and monitoring public health initiatives. These technologies are providing useful data which helps government in monitoring and effectively updating strategies for health reforms (30). Recently, government of Singapore used WhatsApp, a mobile based application, to communicate authentic information regarding the related governmental initiatives and the prevention methods public needs to adopt (24). Singaporean government has also used contact tracing applications for tracing possible exposure to the contacts of an individual citizen identified corona positive (15). South Korean government have also used social media and mobile text messaging to update and communicate citizens' regarding the important information about COVID-19. Moreover, South Korean government in collaboration with the private sector also have used location-based transportation applications in addition with contact tracing applications to keep a check upon the spread of COVID-19 (24). M-government is a step ahead of traditional e-government initiatives. It provides opportunities which were not available previously. It not only improves the delivery of government information and services by providing ease in accessibility, but it also has overcome connectivity issues inherent in PC-based e-government initiatives. Abundance of mobile devices have helped government opening additional channels of communications with the citizens. This has also proved itself way more useful and cost effective than the traditional wired network both in densely populated and in geographically challenged locations (20, 29).

THEORY OF DISRUPTIVE INNOVATION

Theory of disruptive innovation gained popularity amongst both practitioners and researchers alike (31). Disruption was explained by Christensen (2015) as a process through which existing businesses are effectively challenged by new entrants in a market with minimal resources. The authors described that incumbents, while developing and improving products for their existing customers, get carried away with meeting requirements of their most important and most profitable customers at the cost of ignoring segments having lower profitability and importance in the eye of the incumbents. Thus, the incumbents exceed requirements of a segment of their clientele while leaving others high and dry. The segment being left out becomes then the target market for new entrants. The new entrants then offer products or services to this left out group with sometime a different set of functions then the market leader and often at a cheaper price. Once these new entrants establish their position in the market. They start targeting upscale customers. Delivering with the efficiency the profitable customers requires while using the advantage which the entrants have developed serving the least attractive market. Disruption takes place when the new entrant becomes successful in the mainstream market by attracting the bulk of customers in the most profitable segment (31, 32)

Christensen (2015) emphasized upon understating of the requirements of the theory before labeling any product or service as disruptive. According to the author, disruption occurs when the incumbent overlooks the existing or potential customer base. It can happen at the lower end of the market where incumbents ignored the needs of the business due to low profit margins. Or the new entrant can find a new market turning in those customers which were not consumers previously. However, the point to remember is that disruptive innovations are cheap in price and lesser in quality. Mainstream customers only start adopting these when the entrants improve the quality to the level which is required by the main market (31).

UNDERSTANDING M-GOVERNMENT- COMPARISON OF EXISTING DEFINITION

KUSHCHU & KUSCU (2003) HAVE DEFINED MOBILE GOVERNMENT AS APPLICATIONS AND POLICY CONCERNING USAGE OF ALL TYPES OF WIRELESS AND MOBILE TECHNOLOGIES TO PROVIDE ADDITIONAL BENEFITS TO THE BENEFICIARIES OF E-GOVERNMENT. THEY HAVE ARGUED THAT M-GOVERNMENT CANNOT REPLACE THE E-GOVERNMENT SERVICES, RATHER M-GOVERNMENT IS GOING TO COMPLEMENT E-GOVERNMENT SERVICES. M-GOVERNMENT ADDS MORE CONVENIENCE TO THE E-GOVERNMENT SERVICES BY PROVIDING THE USERS EASE OF ACCESS. IT OFFERS MOBILITY TO THE E-GOVERNMENTAL SERVICES; PROVIDING OPPORTUNITY TO ACCESS REAL TIME INFORMATION. THE VERY NATURE OF MOBILE AND WIRELESS NETWORKS PROVIDES ADDITIONAL BENEFIT OF CONVENIENCE TO THE BENEFICIARIES OF E-GOVERNMENT SERVICES IN THE COUNTRIES WHERE E-GOVERNMENT SYSTEMS ARE ALREADY ESTABLISHED. NATIONS LAGGING BEHIND IN IMPLEMENTING E-GOVERNMENT SERVICES HAVE THE OPPORTUNITY TO ADAPT M-GOVERNMENT AS PRIMARY TECHNIQUE OF PROVIDING CITIZENS ACCESS TO GOVERNMENTAL SERVICES ESPECIALLY AT THE PLACES WHERE ACCESS IS THE CHALLENGE (33). SANDY & MCMILLAN (2005) SUPPORTING THE PREMISE OF KUSHCHU & KUSCU (2003) HAVE DEFINED M-GOVERNMENT AS A "COMPLIMENTARY SUBSET OF E-GOVERNMENT". THEY ARGUE THAT IT IS THE CONVENIENCE OF MOBILITY WHICH M-GOVERNMENT APPLICATION ADDS TO THE E-GOVERNMENT (9). OECD ALSO DEFINES M-GOVERNMENT AS BRANCH OF E-GOVERNMENT. IT ARGUES THAT M-GOVERNMENT UTILIZES WIRELESS AND MOBILE TECHNOLOGIES TO DELIVER GOVERNMENTAL SERVICES TO THE CITIZENS (20). MOST RESEARCHERS WHILE DISCUSSING M-GOVERNMENT HAVE DEFINED IT EITHER AS A SUBSET (10, 34), EXTENSION (21) OR A DOMAIN (22) OF E-GOVERNMENT. HOWEVER, ALBASHER & STONE (2016) HAVE OPPOSING VIEWS TO IT. WHILE AGREEING TO THE SIMILARITIES BETWEEN E-GOVERNMENT AND M-GOVERNMENT THEY FIRST TAKE STOCK OF THE COMMON FACTORS BETWEEN E-GOVERNMENT AND M-GOVERNMENT. THEY ARGUE THAT BOTH TYPES ESTABLISH TWO-WAY COMMUNICATIONS, BOTH FACE RISK OF PRIVACY AND SECURITY, BOTH REQUIRE SOME ICT SKILLS, BOTH FACE RISK OF COST OF USED DEVICES AND ACCESSING INTERNET. ACCORDING TO ALBASHER & STONE (2016), M-GOVERNMENT OFFERS THE FEATURE OF MOBILITY WHICH IS DIFFERENT, UNIQUE AND AN EXCLUSIVE FEATURE WHICH HELP OFFERING SUCH DIVERSE RANGE OF SERVICES WHICH ARE NOT POSSIBLE TO BE PROVIDED THROUGH E-GOVERNMENT SOLUTIONS. THEREFORE, THEY CONCLUDE THAT M-GOVERNMENT SHOULD NOT BE CONSIDERED AS SUBSET OF E-GOVERNMENT. THEY PROPOSE IT THE OTHER WAY AROUND, CLAIMING E-GOVERNMENT TO BE A SUBSET OF M-GOVERNMENT (35). THERE ARE OTHER RESEARCHERS (36, 37) WHO IN THEIR OWN WAY HAVE SUPPORTED THE IDEA. ROSSEL, FINGER AND MISURACA (2006) HAVE ARGUED THAT M-GOVERNMENT IS A MEDIUM OF CHANGE WHICH IS GOING TO LEAD MODERN SOCIETY BY EXPANDING THE BOUNDARIES OF THE GOVERNMENT TO THE DOORSTEP OF PUBLIC.

THE VERDICT

Applications of technology are diverse. Technology opens possibilities and creates avenues which were unimaginable some time ago. It initiates changes which ultimately entirely change the fabric of the society. This results in new needs and new requirements resulting in creation of new solutions to solve the newly introduced problems (38). M-government being a technological solution is no different. It is bringing possibilities on the table which were unthinkable previously. The dynamic nature of m-government may have pushed researchers to suggest that m-government is more than e-government by arguing that e-government is subservient to m-government where later is claimed to be superset of earlier (35) . However, majority of authors do not agree. Researchers after thoroughly evaluating literature regarding m-government have identified two common characteristics of definitions of m-government. First is that m-government is using mobile technologies either for providing another platform

for existing e-government services or for developing new services. Second characteristic is that m-government is no different than e-government; it is either subset, complement or extension of e-government services (39, 40). A few of researchers have highlighted features of m-government which they claim serves purposes not covered by e-government. Georgiadis & Stiakakis (2010), have identified characteristics of governmental services which according to them should be delivered only through mobile based platforms. Since these services met the needs which were not possible to be met using ordinary e-government services (41). This can be considered as admission of authors to the fact that there are certain citizen needs which cannot be fulfilled using the e-government services. Citizens cannot use e-government services while they are away from their home or office or while they want to utilize their dead spots in a day etc. These are only m-government services which meet these needs. This gives reader ideas that m-government has characteristics which are different than those of e-government services. This further contradicts Georgiadis & Stiakakis (2010) own point of view of when they claim that m-government is not different from e-government. It seems that the possibilities attached with m-government are numerous. It makes the issue confusing for those who want to evaluate m-government while trying to confine its dynamic nature into the traditional role of e-government.

In-fact comparing m-government services closely to the definition and requirements of disruptive innovation as was defined by researchers (31), it becomes clear that m-government is a disruptive innovation on the path of offering disruption to the way governments is running today. The authors explained that disruptive innovation takes places either in low end of the market or provide utility to new set of customers which were not taking advantage of such services previously. Furthermore, the authors claimed that disruptive innovation are adopted by upscale market, making it mainstream only after these innovations improve the quality to meet requirements of the mainstream market (31). M-government offers access to the individuals which had not had the opportunity to directly access governmental services within their geographical location thus providing m-government services foothold in an entire new marketplace which is the first requirement of being disruptive innovation. And yet m-government services might not provide complete solution to the issues which individuals face due to existing limitations in cellular technology, verification procedures and law of the land. Therefore, it would take time to mainstream m-government services which would be possible only if m-government completely provides all the solution to every kind of access issue required by the individual citizen using it. Thus, it does meet the second requirement of being disruptive innovation as well. However, one can argue that how had it not taken over yet, as disruptive innovation does normally. The answer again lies with the researchers (31) working in the field of disruptive innovation. According to researcher's disruption is a process which takes its due course of time. Moreover, m-government is offering the business model which is very different to what incumbent procedures are offering.

Concluding the discussion, we propose to define m-government as a disruptive technology, offering economical solution to resolve the governance issues using mobile based technologies ubiquitously available to the targeted users of the service. M-government services may even encompass e-government services. In fact, m-government services are super set of e-government services, offering solutions having much broader horizon than e-government services. Governments taking advantages of social media (24) for purposes like monitoring, surveillance, and information dissemination etc. is also part of m-government services, since the social media is accessible to the general public due to cheap and easy to operate handheld devices.

Understanding the potential of m-government, the opportunities it offers and the disruption which it has power to initiate; all are important factors necessary to understand the role of m-government. This also defines m-government in a way entirely different than that of most of traditional researchers of m-government services. Few researchers (35) have already objected upon the current definition of m-government; presenting their own understanding and version of m-government. Others will follow suit. The visit of literature and evaluation of the research on the topic clearly tells that m-government is a dynamically evolving field and it is going to create opportunities which are difficult to imagine right now.

REFRENCES:

1. Page BI, Shapiro RY. Effects of public opinion on policy. American political science review. 1983;77(1):175-90.

2. Bertot JC, Jaeger PT, Munson S, Glaisyer T. Social media technology and government transparency. Computer. 2010;43(11):53-9.

3. The Future we want, (2012).

4. Castelazo JR. Institutional capacity for the administration of public space. Committee of Experts on Public Administration: United Nations Economic and Social Council; 2016.

5. Field T, Muller E, Lau E. The e-Government Imperative. Organisation for Economic Co-Operation and Development, 2003.

6. Ronaghan SA. Benchmarking E-government: A Global Perspective New York: United Nations Division for Public Economics and Public Administration (UNDPEPA), 2002.

7. UN. UN Global E-government Survey 2003. United Nations, 2003.

8. Waller L, Genius A. Barriers to transforming government in Jamaica: Challenges to implementing initiatives to enhance the efficiency, effectiveness and service delivery of government through ICTs (e-Government). Transforming Government: People, Process and Policy. 2015;9(4):480-97.

9. G.A. Sandy, McMillan S. A success Fators Model for M-Government. 2005: 349–58.

10. Shareef MA, Kumar V, Dwivedi YK, Kumar U. Service delivery through mobile-government (mGov): Driving factors and cultural impacts. Information systems frontiers. 2016;18(2):315-32.

11. ITU. ICT Facts Figures 2016. 2016.

12. ITU. ICT Facts Figures 2017. 2017

13. Almarashdeh I, Alsmadi MK. How to make them use it? Citizens acceptance of M-government. Applied Computing and Informatics. 2017;13(2):194-9.

14. Lee D, Lee J. Testing on the move: South Korea's rapid response to the COVID-19 pandemic. Transportation Research Interdisciplinary Perspectives. 2020;5:100111.

15. Chan J, Gollakota S, Horvitz E, Jaeger J, Kakade S, Kohno T, et al. Pact: Privacy sensitive protocols and mechanisms for mobile contact tracing. arXiv preprint arXiv:200403544. 2020.

16.   UN. United Nations E-Government Survey 2018-Gearing E-Government To Support Transformation Towards Sustainable And Resilient Societies. New York: 2018.

17.   Alqaralleh B, Al-Omari A, Alksasbeh M. An Integrated Conceptual Model for m-Government Acceptance in Developing Countries: The Case Study of Jordan. International Journal of Interactive Mobile Technologies 2020;14(No 06 (2020)).

18.   Sultana MR, Ahlan AR, Habibullah M. A comprehensive adoption model of m-government services among citizens in developing countries. Journal of Theoretical & Applied Information Technology. 2016;90(1).

19.   Shareef MA, Archer N, Dwivedi YK. Examining Adoption Behavior of Mobile Government. Journal of Computer Information Systems. 2012;53(2):39-49.

20.   OECD. m-Government: Mobile technologies for responsive governments and connected societies: Organisation for Economic Cooperation & Development Publishing; 2011.

21.   Trimi S, Sheng H. Emerging trends in M-government. Communications of the ACM. 2008;51(5):53-8.

22.   Henning F, Janowski T, Estevez E, editors. Towards a conceptual framework for mobile governance for sustainable development (MGOV4SD): reviewing the literature and state of the art in an emerging field. 2014 European Group for Public Administration (EGPA) Annual Conference; 2014.

23.   Chen Z-J, Vogel D, Wang Z-H. How to satisfy citizens? Using mobile government to reengineer fair government processes. Decision Support Systems. 2016;82:47-57.

24.   Ting DSW, Carin L, Dzau V, Wong TY. Digital technology and COVID-19. Nature medicine. 2020;26(4):459-61.

25.   Kettani D, Moulin B. E-government for good governance in developing countries: Empirical evidence from the eFez project: Anthem Press; 2014.

26.   UN. UN E-Government Knowledge base: Unite Nations; 2018 [Available from: https://publicadministration.un.org/egovkb/en-us/About/UNeGovDD-Framework.

27.   Almarabeh T, AbuAli A. A general framework for e-government: definition maturity challenges, opportunities, and success. European Journal of Scientific Research. 2010;39(1):29-42.

28.   UN. Un e-government survey 2016 (e-government in support of sustainable development). 2016.

29.   Katara SK, Ilavarasan PV. Mobile technologies in e-governance. 2013:352-3.

30.   Bloom G, Labrique A, Hampshire K, Waldman L. Making mHealth Work for All. 2017.

31.   Christensen CM, Raynor ME, McDonald R. What is disruptive innovation. Harvard Business Review. 2015;93(12):44-53.

32.   Christensen CM. The innovator's dilemma: when new technologies cause great firms to fail: Harvard Business Review Press; 1997.

33.   Kushchu I, Kuscu H, editors. From E-government to M-government: Facing the Inevitable. the 3rd European Conference on e-Government; 2003: Citeseer.

34. Abu-Shanab E, Haider S. Major factors influencing the adoption of m-government in Jordan2015. 223-40 p.

35. Albesher AS, Stone RT. Current state of m-government research: identifying future research opportunities. International Journal of Electronic Governance. 2016;8(2):119-39.

36. Rossel P, Finger M, Misuraca G. " Mobile" e-Government Options: Between Technology-driven and User-centric. Electronic Journal of E-government. 2006;4(2).

37. Misuraca GC. e-Government 2015: exploring m-government scenarios, between ICT-driven experiments and citizen-centric implications. Technology Analysis & Strategic Management. 2009;21(3):407-24.

38. Lee M, Yun J, Pyka A, Won D, Kodama F, Schiuma G, et al. How to respond to the Fourth Industrial Revolution, or the Second Information Technology Revolution? Dynamic new combinations between technology, market, and society through open innovation. Journal of Open Innovation: Technology, Market, and Complexity. 2018;4(3):21.

39. Palka W, Jurisch M, Schreiber V, Wolf P, Krcmar H, editors. Mobile Government, Quo Vadis?-Opportunities and Risks of Mobile E-Government Services. ICMB; 2013.

40. Zefferer T, Teuf P. Opportunities and forthcoming challenges of smartphone-based mgovernment services. Eduard Aibar. 2011:56.

41. Georgiadis CK, Stiakakis E, editors. Extending an e-government service measurement framework to m-governement services. 2010 Ninth International Conference on Mobile Business/2010 Ninth Global Mobility Roundtable; 2010: IEEE.