

Contemporary Research on Mobile Government

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Abstract:

Continuous developments in mobile technology have led to massive acquisition and adoption of mobile devices at a fast pace. The penetration of mobile use is higher in developing countries than that in developed countries. The emerging developments as well as rapid adaptability of mobile technologies have raised research interests in the field of mobile government (m-Government). The aim of this study is to investigate the current status of mobile government research. This study is based on literature reviews. Different terms describing m-Government were used as keywords to retrieve relevant literature published in leading international journals and reputed conference proceedings. Then the main thematic views of each retrieved literature have explored. The papers addressing similar thematic views in terms of contents and contributions grouped in order to compare the research works. It is expected that this study will contribute putting different themes together to show research similarities as well as differences. In-depth examination of the unit of analysis for each article will further articulate the dimension of the research domain. Thus, the study will provide researchers with extended understanding of research trends on m-Government.

Keywords: M-Government, mobile government, mobile e-Government, m-Government services.

1. Introduction

Information and Communication Technologies (ICTs) usages in public sectors emerged in late 1990 as a result of internet boom (Grönlund & Horan, 2005). Practices that involve use of ICTs by public sectors are referred to as electronic government (Heeks, 2006; Trimi & Sheng, 2008). M-Government is one of electronic government practices. Such practices are vital in government services delivery- for example, buying transportation tickets using mobile phones in some developed countries. It is not so long that research community has been investigating vigorously the utilization of mobile technology to foster m-Government initiatives. Hence, as a research domain mobile government is a very young field. In order to explore contemporary research on mobile government, we define the term 'mobile government' and describe some implications in introduction section. Then section-2 describes the method of our study; where selection of contemporary research articles on mobile government domain is described. This section also explains how those articles are assessed or reviewed. Section-3 represents the results and finding based on review and analysis of selected research works and outlines the research dimension and research gap. Finally, section-4 represents the conclusion and recommendation.

Mobile Government or m-Government

Mobile government (m-Government) refers to the use of ICTs by government institutions with the help of mobile technologies to deliver electronic services to the public. This definition is derived from the definition of electronic government because m-Government is its subset of electronic government (Ntaliani, Costopoulou & Karetsos, 2007), which is a new and important development in electronic government (Ghyasi & Kushchu, 2004). M-Government can also be defined as "use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms" (Kiki & Lawrence, 2006).

M-Government Services

There are many services that can be offered to citizens through mobile governments. Some of these are:

- M-medicine: delivering health care to citizens with the help of mobile technology
- M-voting: use of mobile technology to participate in electoral processes and participating in democratic reforms
- M-agriculture: use of mobile technology to support farmers by providing updated information on market statistics, weather forecasts, best farming practices and disaster alerts.
- Information broadcasting: use of mobile technologies to disseminate information to citizens.

Objectives of the Study

The main objective of this study is to explore current status of m-Government research. As long as mobile phone growth is increasing, the social and economic implications of m-Government research are becoming vital day by day. According to ITU (2010), the steady growth of the number of mobile phone subscriptions reached an estimated 4.6 billion with penetration of 67% globally at the end of 2009. On the other hand, the share of mobile penetration in developing countries (70%) is higher than that of developed countries. This creates more scope for practicing m-Government in developing countries with limited internet penetration. Wider coverage of remote places, cheaper and easily accessible mobile devices or services and faster adaptation of mobile technology are some of the considerations to promote mobile government with applications or services, ranging from internet services to payment of utility bills, buying tickets etc. But governments are facing several challenges in implementation and diffusion of mobile based integrated services. These challenges emanate either from socio-economic or infrastructure constraints, which have attracted researcher to explore m-Government research domain. Under this situation, the study is intended to investigate contemporary mobile government research to address the following two major research questions:

- What is the current discourse on mobile government research?
- How does contemporary research contribute to mobile government practices?

2. Method

Since m-Government is an inter-disciplinary domain spanning many research disciplines and relevant articles are scattered in different places (journals, conference proceedings, government reports, etc.), it is very critical to choose a representative sample of articles from the research domain. There are several methods to cope with such situation. For example, Andersson & Grönlund (2009) used 'snowball method' to maximize extracting relevant articles. Norris & Lloyd (2006) used a similar method to search more articles based on the bibliographies in the primarily obtained articles. However, none of these methods are sufficient and independent for searching and selecting articles from online databases. Under this consideration, a systematic approach or model was designed (figure-1) combining the search and selection process to select a representative sample of published articles.

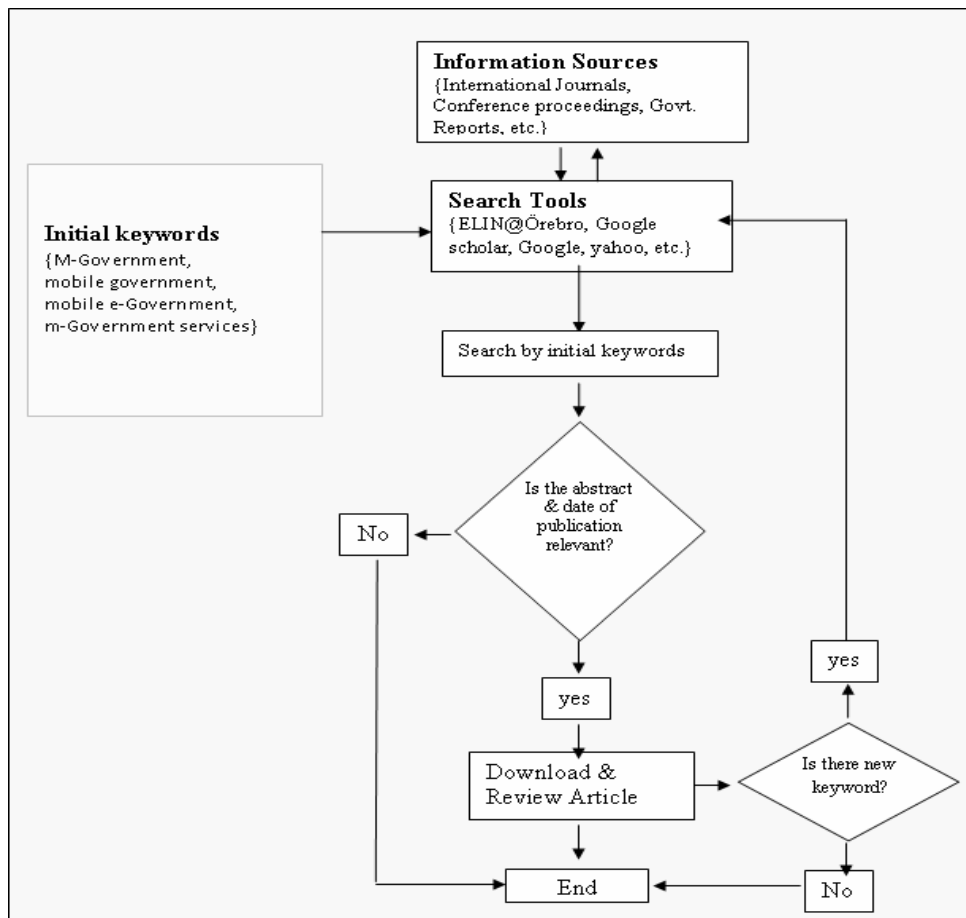


Fig 1: Flowchart Showing Searching & Selection Process of Articles.

In order to retrieve literature, especially the articles, the following primary keywords were used: m-Government, mobile government, and m-Government services. The main thematic views of each retrieved literature are explored. The papers addressing similar thematic views in terms of contents and contributions are grouped in order to compare the research directions.

2.1 Designing the Search Process and Searching Articles

The process of searching articles is an important factor. None of the searching tools (e.g, online library database, search engines like Google, Yahoo etc.) can independently extract all relevant articles from a particular research domain. Therefore, there is necessity to have some systematic process which integrates several searching tools so that relevant articles may not be excluded during the selection process.

Determining the sources (e.g. journals, conference proceedings, etc.) also plays a good role in retrieving the best articles. The prime searching tool for finding articles in this study was ELIN@Örebro, an electronic library information navigator; which is a general search interface of Örebro University Library (<http://www.oru.se/English/Library>). The tool ELIN@Örebro provides a list of printed and electronic journals from several databases of well-known content providers such as Directory of Open Access Journals (DOAJ) which contains about 2,800 free journals. Some other content providers are Emerald, Sage, Springer, ScienceDirect, Oxford journal, Cambridge journal, etc. The second searching tool used is Google Scholar search engine (<http://scholar.google.com>) while Google and Yahoo search engines were also used to complement ELIN@Örebro.

The articles and research papers were searched on the basis two criteria. The first criterion was use of key-words i.e. m-Government, mobile government, mobile e-Government, m-Government services to retrieve relevant articles. Secondly, the snowball method was used to search relevant articles. According to snowball method, it is assumed that examining the bibliographies of available articles might provide more new articles. For example, 17 out of 41 selected articles were obtained using snowball method

2.2 Selecting Articles

Selecting relevant articles is always a subjective matter as someone may consider an article as more relevant while another person may not consider so. The systematic approach of selection (figure-1) somewhat guided the authors to avoid subjective selection. On the basis of each keyword (as mentioned in section 2.1) a search tool was used to retrieve articles. As the study focuses on contemporary research, the authors considered articles published in 2001 onwards.

If the title of the retrieved article seemed to be relevant to mobile government, the abstract of the article would be reviewed. If the context of the abstract clearly reflected the research domain i.e. mobile government, then the article would be selected. This facilitated to identify the relevant unit of analysis (i.e., Organization, Group and Individual) of the papers with the research theme as suggested by Webster & Watson (2002). It was found that some of the abstracts were not well articulated and did not clearly reflect the research domain. This called for the authors' in-depth review of other sections of the retrieved papers to identify the research fundamentals. In such cases, some articles could not be explored in-depth as the source database has only the abstract and did not provide full-text article. So we had to abandon those articles. Finally, if the article content seemed to fall under the research domain, it would be included in the list of articles. If the retrieved article contained new relevant keywords, the keywords would also be used in next search. This process was repeated to get adequate number of articles.

Our initial target was to collect at least 50 research articles focusing on m-government published since 2001. We tried to maximize our available resources (search tools) and only a total of 41 research works were finally selected from various sources as mentioned in results section 3.0.

2.3 Reviewing Selected Articles

The contributions of selected articles were summarized according to three thematic areas i.e. "General", "Infrastructure and Implementation frameworks" and "Service delivery, usage and improvement". Since there are several issues like accessibility, digital divide, infrastructure development, service delivery, security and so on, the motivation of grouping similar issues and works in a thematic area is to have interrelated discussion and reflection in the analysis. However, the differences and common aspects discussed in several sections of the selected articles especially, abstracts, methods and conclusions were also analyzed and described in the content analysis (section 3.1).

3. Results and Findings

The study is based on a total of 41 research articles (as shown in table-1) out of which 8 are journal articles and 30 were published in conference proceedings. The rest (3 articles) are in 'others' category which contains one government published reports and two from book chapters. Table-1 shows number of selected research works on m-government presented according to publication category and year of publication. Most of the articles on m-government were found in the conference proceedings (30) while a few (8) were found in the journals like Electronic Journal of E-Government (EJEG), Electronic Government, an International Journal (EGIJ), Government Information Quarterly (GIQ), Technology Analysis & Strategic Management and Journal of Information, Communication & Society.

Table-1: Number of Selected Research Works on m-government (2001 and onwards)

Publication Category*	Year										Total
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Journal Articles						2		5	1		8
Conference Proceedings			2	1	11	4	4	1	7		30
Others (e.g. Govt. Report, books, etc.)	1			1					1		3
Total	1		2	2	11	6	4	6	9		41

The year-wise breakdown of research works in table-1 shows a trend in research progress. It shows that m-Government research domain basically came to attention by the researchers since 2003. The number of research works is higher in 2005 e.g. among selected 41 articles 11 are from the year 2005. The work steadily declined in 2006 (i.e. 6 articles) and remained same on an average up to 2008. In 2009, research on m-government increased e.g. our sample contains 9 articles in the year 2009. As the year 2010 is just beginning, no article was found.

The selected research works are also classified according to three main thematic areas as in table-2. The table counts only the 38 articles from journals and conference proceedings and 3 articles in 'Other' category are excluded. Out of 38 articles, "General" thematic area has 19 articles; "Infrastructure and Implementation frameworks" thematic area has 8 articles while "Service delivery, usage and improvement" thematic area has only 11 articles. Out of 3 articles, as shown in publication category 'Others' in table-1, two articles i.e. one government report and one article from a book chapter are in the 'General' thematic area; while the third article is in the "Infrastructure and Implementation frameworks" thematic area.

Table-2: Classification of Research Works on m-government according to Thematic Area (2001 and onwards).

Thematic Perspective→ Year ↓	General		Infrastructure and Implementation frameworks		Service delivery, usage and improvement		Total
	Journal	Conference	Journal	Conference	Journal	Conference	
2001							
2002							
2003		2					2
2004		1					1
2005		4		4		3	11
2006	1	1			1	3	6
2007		2		1		1	4
2008	3		1	1	1		6
2009		5		1		2	8
2010							
Total	4	15	1	7	2	9	38*

* The table excludes 3 articles, categorized as 'Others' publication in table-1

Categorizing of articles into relevant thematic areas is a cumbersome and sometimes dubious task during the literature review. According to Webster & Watson (2002), concept-centric literature review determines an organizing framework of the review. It helps to identify concepts by synthesizing the literatures and thereafter to compile a concept matrix. Then a logical approach can be applied through grouping and presenting the key concepts or themes. Table-3 shows the categorization of selected articles in a concept-centric approach.

Table-3 shows that out of 41 selected articles, 22 are in the thematic group 'General', 9 articles in 'Infrastructure and Implementation frameworks' and the rest 10 articles are in 'Service delivery, usage and improvement'.

SN	year of publication	* Source type	Article Name **Unit of analysis→	Concepts									
				General			Infrastructure & Implementation frameworks			Service delivery, usage & improvement			
				O	G	I	O	G	I	O	G	I	
6		CP	A Novel Methodology for M-Government Performance Evaluation in Fuzzy Area								X		
7		J	e-Government 2015: exploring m-government scenarios, between ICT-driven experiments and citizen-centric implications			X							
8		Ot	Mobile Computing: Concepts, Methodologies, Tools, and Applications			X							
9		CP	M-Government Services Initiatives in Oman							X			
10	2008	J	Mobile government: A challenge for agriculture	X									
11		J	Emerging Trends in M-GOVERNMENT		X								
12		CP	m-Government: A framework of mobile-based emergency response systems					X					
13		J	Effective use of mobile communication in E-government: How do we reach the tipping point?									X	
14		J	M-government: technologies, applications and challenges	X									
15		J	Integrating Internet, telephones, and call centers for delivering better quality e governance to all citizens						X				
16	2007	CP	mGovernment: A Reality Check			X							
17		CP	Improving Service Matching in M-Government with Soft Technologies									X	
18		CP	Application of M-government system in Beijing Municipal Government					X					
19		CP	Emerging Mobile Government Services: Strategies for Success	X									
20	2006	CP	Government as a Mobile Enterprise: Real-time, Ubiquitous Government										X
21		J	"Mobile" e-Government Options: Between Technology-driven and User-centric			X							
22		J	Using SMS Texting to Encourage Democratic Participation by Youth Citizens: a Case Study of a Project in an English Local Authority									X	
23		CP	"Mobile Government: Towards a Service Paradigm"										X
24		CP	Towards Understanding Success Factors in Interactive Mobile Government			X							
25		CP	M-GOV: The Evolution Method								X		
26	2005	CP	Simple implementation framework for m-government services						X				
27		CP	Transcending e-Government: a Case of			X							

SN	year of publication	* Source type	Article Name **Unit of analysis→	Concepts										
				General			Infrastructure & Implementation frameworks			Service delivery, usage & improvement				
				O	G	I	O	G	I	O	G	I		
			Mobile Government in Beijing											
28		CP	"M-government: South African Approaches and Experiences"					X						
29		CP	A MULTI-PERSPECTIVE EFFECTIVENESS EVALUATION METHODOLOGY FOR MGOVERNMENT (MPE2M-mG)											X
30		CP	M-Government in Hungary		X									
31		CP	USE-ME.GOV (USability-drivEn open platform for Mobile GOVERNment)										X	
32		CP	A Proposed Architecture For Mobile Government Transactions						X					
33		CP	Infrastructures for Mobile Government Services						X					
34		CP	M-government Implications For E-Government In Developing Countries: The Case Of Saudi Arabia		X									
35		CP	M-Government Framework					X						
36		CP	Mobile Government and Organizational Effectiveness	X										
37	2004	CP	E-Government and m-Government: Concurrent Leaps by Turkey			X								
38		Ot	Architecture for Implementing the Mobile Government Services in Korea					X						
39	2003	CP	From E-government to M-government: Facing the Inevitable			X								
40		CP	A Swedish view on mobile government.	X										
41	2001	Ot	M-Government: The Convergence of Wireless Technologies and e-Government	X										
			Total = 41	8	4	9	1	5	4	3	4	3		

Source table: Webster & Watson (2002).

* Source type: **J=Journal, CP= Conference Proceedings and Ot=Others**

** Units of Analysis: **O= Organizational, G= Group, I= Individual.**

In terms of unit of analysis, table-4 shows that most of the selected articles (12) focus on organizational aspects while the remaining articles are focused on group (13) and individual (16).

3.1 Content Analysis: Mobile government Research and Several Scholars

M-Government is an emerging discipline and it is in its early stages of development (Antovski & Gusev, 2005) and it has been regarded as the next inevitable direction of evolution of e-Government (Amailef & Lu, 2008). The discipline is growing in terms of research as shown in results. We found that selected researches on m-Government focus on the areas of service delivery improvements, digital inclusion, infrastructure and implementation frameworks, future prospects and challenges, security, acceptance, etc.

Infrastructure and implementation frameworks

Public service delivery, quality improvement, infrastructure and implementation frameworks are the most discussed areas in literature. Building robust mobile technology infrastructure is considered to be a sustainable strategy. Implementation processes have

an impact on technology adoption. Therefore implementation requires an understanding of public sector organizational structures, citizen's needs and cultural factors to adopt technology. A study by Nan et al. (2009) indicates that non-tech factors such as cultural perspective show "more significant impacts in the process of innovation diffusion and service utilization in the ubiquitous network society".

In the past few years, there were "no well-defined methodologies available on how to implement government services to the different parties from present e-Government facility to future m-Government one" Mukherjee (2005). But many studies today including Mukherjee & Biswas (2005) have suggested implementation frameworks for mobile government services to different parties like citizens, businesses and governments. Amailef & Lu (2008) recommends a framework of MERS (Mobile-based Emergency Response System) that offers new opportunities for interaction between governments and other parties in case of emergency. For example, weather forecast can be broadcasted through mobile based Short Message Service (SMS) to fishermen and residents of coastal areas in order to help them to have shelter and precaution measure in time. Thus infrastructure and implementation frameworks suggested in literature aim at improving service delivery.

Service delivery

Robust frameworks would guarantee quality of service delivery. Antovski & Gusev (2005) recommends frameworks for public services delivery in m-Governments to focus on principles of: interoperability, security, openness, flexibility and Scalability. These principles can help in overcoming problems related to infrastructure development and raise the common like privacy, security, legal and interoperability as in e-government infrastructure. Fasanghari & Samimi (2009a) provides m-government model that can be used as an implementation framework. This model includes six phases of e-Government, migration, primary interaction, fully interaction, transaction and ubiquity. Numerous mobile services are provided at each phase of implementation.

Besides infrastructure and implementation frameworks, there are other frameworks that would improve on service delivery in m-governments in terms of operations. Ntaliani, Costopoulou & Karetos (2007) suggest a framework for identifying appropriate and cost-effective m-Government for the agricultural sector. He emphasizes that the future challenges for the implementation of m-Government is the creation of effective business cases (e.g. tourism, health, agriculture) and thus considering issues of cost, which would benefit m-Government sectors especially mobile agriculture (m-Agriculture). Antovski (2007) also discusses the M-Gov architecture based on technical and a financial perspective and that can be used in integration scenarios (small to large administration agency scenarios). The architecture aims at service delivery improvement focusing on major components like access, service discovery directory and the collection of public electronic services from different sources.

Historical evolution and transformations

Other studies analyze historical evolution of m-Government. Rossel, Finger & Misuraca (2006) provide an illustration of the activities that have led to positive transformations in delivery of public services through use of mobile forms of Information and Communication Technologies (ICTs). Kiki & Lawrence (2006) also highlights some of electronic service categories, i.e., m-Communication, m-Services, m-Democracy, m-Administration that have merged due to advancements in mobile government. It is clear that all these developments lead to positive transformations in government agencies.

Measuring effectiveness

Lastly, measuring the effectiveness of m-Government services is one of the major areas which have been investigated in efforts to improve and enforce quality service. Measuring service quality is carried out through service performance evaluations as suggested shown by Fasanghari & Samimi (2009b). Kiki (2007) highlights the barriers to the success of m-Government service projects e.g. limited participation of local and government authorities

and interoperability issues between departments. It is therefore imperative to carry out evaluations on m-government services and projects so that service quality is improved and failures are overcome.

Prospects and challenges

M-Government challenges, success factors and application are also widely discussed in m-Government research. According to Mengistu et al. (2009), providing mobile services involves many challenges due to "complexity of different mobile technologies, creating secured networks to deliver reliable service, and identifying the types of services that can be easily provided". Challenges include security, privacy and legal issues. Kiki & Lawrence (2006) mentions some of the challenges as theft and loss of handheld devices, password cracking, data interception and viruses. Though these challenges can act as setbacks, the adoption of mobile technologies is relatively high. M-government provides faster services which is a success factor. For example, after implementing an m-government System in Beijing municipal government, the average repair time for one asset reduced rapidly, from one week to several hours (Cao & Luee, 2007). Besides, less time in operation processes, there are other benefits of m-government e.g. reduced costs, fulltime (24/7) service delivery and effective communication. In addition, Singh & Sahu (2008) urge that multi-platform approach of service delivery (where both mobile and fixed line phones are used) leads to enhancement in delivery of e-government services via internet and can eventually bridge the digital divide gap. A majority of literatures show that the higher prospects of m-Government application areas include m-Health, m-Agriculture, m-Learning, communication, etc. Vincent & Harris (2008) show that effective use of mobile communication can lead to communication improvements in government agencies.

Policy formulation and legislation

Other important aspects discussed in m-Government literature include policy formulation and legislation. There is a need to have policies that can act as guidelines and assurances for m-government.

3.2 Methods used in m M-government Research

The methods used in the selected articles were reviewed. The reviews find that there are various methods used in m-Government researches. Some of them are based on empirical studies (qualitative or quantitative) like case study or survey, while others are based on theoretical analysis like policy reviews. For example, literature review (Singh & Sahu, 2008), case studies (Mengistu et al., 2009; Vincent & Harris, 2008), questionnaire survey (Nan et al., 2009), comparison test (Antovski, 2007), etc.

3.3 Knowledge Gap in M-government Research

Research similarities and differences are explored and summarized to identify the knowledge gaps. As discussed in the previous section, literature on m-Government domain discusses a wide range of issues which empower m-Government research. While many authors used various methods in their research processes, it was realized that most of the research articles excludes user (citizen) involvement. We believe, this is one of the research gaps to be filled especially when researching on service quality in m-Government. In this case, it is necessary for researchers to investigate citizens' opinions. M-Government is an emerging phenomenon and is influenced by other research domains. There is a need to have elaborative theories focusing on m-Government as an independent research domain. It is therefore necessary to foster researches on elaborative theories, practical implications, relative advantage and disadvantages, etc. of m-Government.

4.0 Conclusion and Recommendation

The study shows that common research areas of m-Government focus on public service delivery, implementation frameworks, historical evolution, challenges and measuring the effectiveness of mobile based services. Since most research methods used in m-Government research do not involve users, we recommend researchers to use methods that involve user surveys in order to serve user preferences and improve the service

quality. On the other hand, some articles identify the most important barriers to m-Government, but do not suggest practical solution. We believe, this study will help potential researchers to identify major thematic views for future research in the field of mobile government. We also observed that different researchers use the name of the research domain differently. For example, 'm-Government', 'mobile e-Government', 'mobile government'. We argue the research community to agree on usage of a standard form such as 'm-Government'.

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