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MOBILE GOVERNMENT, QUO VADIS? – OPPORTUNITIES AND RISKS OF MOBILE E-GOVERNMENT SERVICES

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Abstract

Over the recent years the development of mobile information and communication technologies (ICT) lead to an "always-on society" worldwide, people are available 24 hours a day, seven days a week. This social and economic progress also has a significant influence on government. The demand arises to have anytime, anywhere and from any mobile device access to government services. Governments already reacted on this demand, attempting to make public services and information accessible to their citizens and businesses through mobile and wireless technologies. This adaption became commonly known under the term mobile government. The purpose of this research is to outline the future development of mobile government considering opportunities and risks. Therefore a view on the state of mobile government research is done based on a literature review and a SWOT-analysis.

Keywords: mobile government, m-government, ICT, literature review, SWOT-analysis.

1   Introduction

During the last decade, mobile information and communication technologies (ICT) have significantly influenced the social and economic development worldwide. Today we live in an "always-on society" world, where people are always available and expect to have access to information and services anytime and everywhere (Zefferer, 2011). Recent statistics show that mobile ICT are an important part of the human life. By the end of 2012, there were an estimated 6 billion mobile cellular telephone subscribers worldwide. Over the past years the number of ICT services continuously increased, with the exception of fixed telephony. Also important is the diffusion of broadband networks. Over the past five years the number of fixed-broadband subscriptions has been doubled. The strongest growing sector is the wireless-broadband internet access. Today more and more internet users are shifting from fixed to wireless connection, because the access to wireless-broadband is gaining currency. The many developments of ICT also exhibited a positive impact on the interaction of governments with their customers. The wireless technologies and services enable a better alignment of governments to the needs of their users, citizens, and companies. Customers of government services can use online-services time- and location-independent. Also internally within the government there is a growing trend towards mobility. Due to the use of mobile services the efficiency of government service delivery increased. Mobile devices can help governments in gathering information and in supporting communication and transaction processes. Recent technological advances and the resulting increase of mobile devices make the issue mobile government very interesting. The use of mobile services provides new opportunities and benefits but also brings along challenges and risks for governments, citizens and all potential users of mobile government applications. Therefore, the design and the implementation of mobile government applications must be planned carefully to recognize chances and minimize risks. Against this background, we seek to answer the following two research questions within this paper: (1) *what is the state of the art of mobile government research?* and (2) *what are the opportunities and risks of mobile government?*

To answer this question, we conduct a comprehensive literature review on the topic of mobile government. The results illustrate the state of mobile government research with a focus on publication year, research areas, strength, opportunities, and possible future development in research. This research contributes to theory by providing a description and conceptual clarification of the term mobile government. More so, we derive recommendations and illustrate the need of further research.

2   Theoretical Foundation

The emergence of new ICT, especially the rapid growth and adoption of mobile phones around the world, has changed the interaction between government and its stakeholders fundamentally. Traditional government can use ICT to change values, beliefs, structure and attitudes of public organizations. With digital government service-oriented e-government was born (Fasanghari and Samimi, 2009). In 2003, the OECD (Gadriot-Renard, 2003) defined e-government as "the use of ICTs, particularly the Internet, as a tool to achieve better government". Hence, web-based Internet applications improved governments' fundamental functions. Nowadays these functions can benefit from the just described development in wireless and mobile technologies. In a world where efficiency and speed matter the most, mobile technologies support government institutions, individuals and businesses. Therefore, a new direction in e-government was created: mobile government, that can be defined as "a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units" (Kushchu and Kuscu, 2003). In literature there are a lot of different definitions of mobile government, but they almost all contain two common principles: (1) mobile government is characterized by using mobile technologies for e-government services that contains both the development of new services and the enrichment of

existing e-government approaches by using new mobile technology; (2) mobile government can be seen as a subset, complement or extension of e-government, they are not two separate entities.

Like in e-government, there are four different levels of interaction for mobile government (Fasanghari and Samimi, 2009). **mG2C** services should simplify citizens' access to data and the utilization of government information. With **mG2B** government can support small and medium enterprises and their business development, as well as they can provide necessary information. More so, mobile technologies support governments' employees (**mG2E**) in remote or secondary locations and field crews by facilitating real-time access to work on data. **mG2G** refers to interagency relationships and the interaction between governmental agencies (Firoozy-Najafabadi and Pashazadeh, 2011). With the development of an integrated back-office infrastructure governments can transform themselves into a connected entity in order to be more efficiently and effectively regarding the citizens' needs. On the one hand there are connections among government agencies (horizontal), on the other hand local and central government agencies are connected (vertical).

3 Methodology

To get a general understanding of the term mobile government, we performed a detailed literature review that follows the structured approach of Webster and Watson (Webster and Watson, 2002). In a first step, we searched with the key words "mobile government", "mobile e-government", and "m-government" in the following four online databases: Ebscohost, ScienceDirect, ACM-Portal, IEEExplore. Next, we pre-selected the identified articles by considering title and abstract of each item. After that, we perused the 158 articles that resulted in a list of 108 remaining papers. In the last iterative step, we analyzed the references of the remaining articles and added new articles to determine the current state of research. Finally, we identified 201[1] relevant contributions from all over the world.

4 Results

4.1 Year of Publication and Research Area

The first articles concentrating on the term mobile government date back to 2002. Overall, we found five articles from Asia, Europe, and America dealing with this topic. One of the first mobile government applications based on messages was the cooperation of Siemens and the Department of the Interior of Austria in November 2002 in order to send out election results of the parliament by means of Short Message Services (SMS). Since then, the trend of mobile government shows a steady rise. With 33 articles mobile government came to a climax in 2005. After that phase, a phase of saturation followed and the number of articles decreased in the following two years. In 2007, there were only 16 papers found in literature. In the next years the number increased again. 30 articles were detected in 2010. The year-wise breakdown of research articles shows a trend in the mobile government research progress.

To get more information about the topic and its future trends, it is useful to map all articles to research areas. The aim is to determine the main focus and weak points of each continent concerning mobile government and to derive possible future recommendations and further need of research according to these findings. But there is no classification of mobile government research areas in literature yet. Hence, in the context of this work, we performed a specifically generated categorization based on the main topics found in literature. Therefore, the key factors and characteristics of the 201 contributions were identified and compared with each other. Subsequently there were six research areas elaborated,

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[1] The list with all 201 contributions found in the literature review is available upon request from the authors.

named "General", "Frameworks and models", "User needs", "Security", "Mobile services", and "Success factors". We assigned the 201 contributions to their matching research areas for better analysis of the development of mobile government and differences between the five continents. In the following paragraphs, we present the essential concepts and their factors of each single research area.

The *general* research area comprises all articles that concentrate on mobile government overall. This includes all articles with the main focus on definitions, development, trends, quality improvement, benefits, and challenges of mobile government. This research area with 70 contributions is the most discussed one. That is not surprising, because the term mobile government is in its early stages of development. Also worth mentioning is that articles not only come from every continent, but also in every year since 2002. The most frequently quoted and one of the best representative papers here is from Kushchu and Kuscu (2003), who give an overall view of mobile government. After having the necessary groundwork, a next important area is *mobile government frameworks and models*. Building a robust mobile government framework is a sustainable strategy. Therefore, a general understanding about mobile and wireless technologies, government structure, citizens' needs and country-specific factors is needed. 38 studies are dealing with this topic considering different stakeholders, mobile technologies, and principles for introducing their framework. *Mobile Services* require a robust framework to improve their service delivery in mobile government (Ntaliani et al., 2008). There are 37 articles about pilot projects, services, and work done in the field of mobile government. Worldwide, there are a lot of mobile services for different user groups using existing platforms and frameworks. When building mobile services public administrations have to take into account the *users' needs* and their basic requirements. Users can be citizens, employees, business or other governments (Fasanghari and Samimi, 2009). So it is crucial to find out and evaluate the different requirements. This includes social, psychological and technical needs (Germanakos et al., 2005). The most important requirement for mobile government is *security*. Users have to trust the system and feel save and confident. For every user and governmental authority the different mobile government services need to be secure (Karantjias et al., 2007). In almost every article the term security is mentioned. Hence, it is not surprising that 21 articles concentrate on this topic. Knowing critical *success factors* can support the planning and implementation of mobile government services. Therefore, it is important to write down experiences, lessons learned, and success factors of initiatives and projects. Of course, the relative importance of success factors is varying depending on the type and size of the mobile service, but by using such knowledge for building new services mistakes can be avoided. Considering the results of the distribution of the 201 articles across the six research areas, detailed statements and recommendations to further mobile government action can be derived. In a holistic view, scientific research is ahead of the realization in practice.

In Africa some groundwork has been done for mobile government. Having two articles in the research areas "General", "Frameworks and models" and "Mobile services" shows that they are dealing with this topic. Africa is a developing continent with probably less research on technological and new topics like mobile government. First, it is important for them to have a robust ICT infrastructure they can use, before starting to introduce mobile government services. Thus, by implementing mobile government it could be suitable to have a look at successful completed projects from developed countries. In the scope of this classification there was no American article that concentrates on success factors. Most of their articles were assigned to the "General" research area, so they have already a stable groundwork. America is ready to advance in its mobile government evolution. Therefore in a next step they should focus on the one hand on secure frameworks and models and on the other on writing down their experience from successfully closed projects as lesson learned for further initiatives. In contrast, with 21 contributions Asia has done a lot of work in the field of "Frameworks and models". An explanation for this might be that at present, introducing mobile government services is still in its initial stages and they need more systematic planning (Zhou and Ma, 2011). Therefore, proceeding with this research is recommendable, because in developing areas, like Asian regions, mobile services could have a big potential to improve the interaction between citizen and government. In Australia is a big focus on success factors for mobile government. With eight contributions in this research area Australia is leading in dealing with this research topic. They also have a closer look on

frameworks, models and user needs. So with this knowledge and the wide spread of mobile devices they can start with implementing more mobile services. Europe with its well built infrastructure and the wide distribution of mobile ICT has the best conditions for the implementation of mobile government. In each research area besides "Frameworks and models" and "Success factors" they have the most contributions. They have already made a big improvement in building mobile government, so they should write down their experience, success factors and lessons learned to support follow-up projects. A further recommendation could be to develop a general guideline how to introduce mobile government that can be used to avoid mistakes in upcoming mobile government projects worldwide.

4.2   SWOT-analysis

During the literature review all strengths, weaknesses, opportunities, and threats were written down to make an overall SWOT analysis (table 1). In practice, a SWOT-analysis[2] is widely used for analyzing situations and for a future strategic planning (Ferrell and Hartline, 2010). We decided to use this methodology to outline the future trend of mobile government.

Strengths	Accessibility; Always-on; (Anytime-anywhere) Availability; Being comfortable; Better image and perception; Better customer participation; Curiosity and fun; Effectiveness of governmental organizations; Faster information flow; High efficiency; In situ service delivery; Increased channels for service and public interaction; Increased productivity of public services and servants; Individuation; Instant updating of information and data; Larger and wider user base; Location awareness; Mobility, portability and ubiquity; Personalization; Powerful functions; Realistic, feasible; Responsiveness; Save cost and time; Simplicity of mobile ICT; Service scalability; Universality; Usability
Weaknesses	Compatibility; Electric power consumption; Implementation; Inconvenient user interface; Infrastructure development; Initial and on-going solution costs; Limited data processing and storing; Lack of mobile technology standards; Low bandwidth; Privacy threats; Security risks; Small screen of mobile tools; Unstable connectivity
Opportunities	Better management; Better quality; Changing government functions and promoting administrative reform; Contributing to the environment; Connectivity; Cutting through administrational barriers; Democratic Government; Economy; Enhanced network; Expansion and improvement of E-Services; Service interaction improvement; Greater convenience; Increasing administrative efficiency; Less bureaucracy; On-time service delivery; Promoting socialism civilization
Threats	Authentication and validity of mobile; Data overload; Integration process between e- government and m-government; Interoperability; Lack of incentives and institutional structures; Lack of mobile government laws; Lack of trust; Legal issues; Loss of data; Privacy and security; Public and social pressure; User acceptance

Table 1.   The SWOT-analysis for mobile government

Mobile government exhibits a lot of strengths and opportunities for governments' stakeholders, mobile technologies, and services. One of the most mentioned strength is accessibility. Governments plan to provide access to an equal mobile government service and information to all citizens regardless of their mental, psychical or technical capabilities. They should be able to use these services anytime, anywhere and from any wireless device. Also a big strength is that the use of mobile devices allows reaching a larger and wider user base and thus delivers services in situ. Introducing mobile government can improve efficiency, effectiveness and the economy of public services. Mobile government also brings along some opportunities, which especially affects the improvement in services, governmental administration and in contributions to the environment. Besides the advantages of mobile government there are also some weaknesses, limitations, and threats. On the one hand there are concerns regarding the disadvantages of mobile devices, like limited data storing and processing power, low bandwidth, small screens of mobile tools and unstable connections. On the other hand a big topic in mobile government is security and privacy (Kushchu, 2009). As shown early in this paper, dealing with providing security and protecting privacy is one of the most important issues in mobile government. With the rapid growth in mobile devices there is an increasing need for government and user authentication to protect data and services and to foster public trust.

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[2] The list with references and explanations threats is available upon request from the authors.

5   Results

This paper shows the importance of mobile government worldwide by examining all existing contributions according to publication year, continent, research area, strength, opportunities and threats. Therefore, a holistic view of the state of mobile government research is drawn with focus on relevance, research areas, current trends, and possible future development based on a literature review and a SWOT-analysis. The literature review emphasizes the growing worldwide interest in mobile government since 2002. Although mobile government is in an early stage, several mobile services have been introduced. The technical, social, and economic development and the growing mobile technology market illustrate a lot of potential for further research. Mobile government is a big and partly unexplored research area. And, the number of mobile devices increases continuously worldwide, while the number of fixed telephone lines goes down. Especially for countries with a poor fixed line infrastructure mobile government offers an enormous potential. In some regions the only way to get in contact with a governmental authority is by using mobile ICT.

Considering the selected contributions six main research areas could be identified. After mapping the articles from the continents to the research areas we derived some recommendations for each continent. Mobile government is a global phenomenon, so all continents should continue with research work and realization. It is recommendable to look at successful realized projects, their experiences and lesson learned to avoid mistakes. Therefore, it is necessary to write down facts and experiences from an introduction of new mobile government projects. Nevertheless, there are still several weaknesses, limitations, barriers and threats left. In conclusion, besides the large potential and benefits in introducing mobile government, there is still need for further development and research in this area like social use, security awareness, technological research and administrative efficacy.

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