

Adoption model of m-government services

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Abstract - E-government is an important tool for public sector transformation. The number of e-services available on government websites continues to grow by leaps and bounds. The usage of mobile technologies in the public administration not only provides an alternative communication and services channel for citizens, but also allows to go further. M-government is emerging as the next big wave for ICT use in the public sector.

The aim of this article is to find out what are the factors that affect user acceptance of mobile e-government services or how can we motivate the citizens to utilize services. This paper applies the technology acceptance model to explore users' requirements for the adoption and usage of e-government services.

Keywords - e-government; m-government; technology acceptance model

I. INTRODUCTION

Recently the possibilities of electronic communication have significantly improved on both sides - the citizens and the authorities and institutions of the public administration. The inclusion of electronic services in the public sphere enables more effective government, improving the quality of services for the private and business sector, ultimately, increase business support and increase the competitiveness of enterprises in foreign markets. The concept of e-Government also includes the possibility of the opposite approach: the citizen or a company's fielding individual agenda when it suits them - online way and, therefore, at a distance, from the comfort of their home or from their office, faster and more efficiently with lower costs on both sides.

E-government is a government existing on the web and characterized by functions such as information dissemination (government to users), communication, transaction, interoperability (vertical and horizontal integration) as well as participation [10]. The next step in the process of approximation government services to private and business sector is using mobile technologies. Mobile communication technologies are a key catalyst for transformational change of functionalities of governments. Mobile phones have emerged from being a luxury product to a mass necessity. The integration of internet and mobile devices have opened the doors of real mobility and 24×7 services. Mobile devices, equipped with various features and functions, are rapidly changing human social interaction, resulting in both new challenges and new opportunities. These special features of mobile phones have attracted many people to use it. Mobile services have huge potential to be one of the government's

most effective tools, to govern, control, and administer community requirements and justice. In order for the governments to offer acceptable and attainable mobile services, these services have to be used by citizens. [3]

Mobile government services are a subset of e-government. M-government has advanced the dynamic nature of e-government and also created certain channels which either are not available or would be problematic for e-government. This has resulted in offering more dynamic and versatile methods for citizens to access certain government services.

M-government implies the use of mobile technologies (e.g., smartphones and tablets) in e-government. M-government enables location-based services [6], which are "personalized services delivered to a mobile device user at a remote location, so citizens can get immediate access to certain government information and services on an anywhere-anytime basis. The government can use the scalable and swift wireless channels to send time-sensitive information such as terror and severe weather alerts to citizens quickly and directly" [20]. M-government services require another type of data, namely geo-referenced information (data with spatial attributes) [16] and devices which are equipped with a Global Positioning System (GPS) and also Web 2.0 technology enable the efficient and effective information sharing, peer creation, and collective deliberation [13].

Since one of m-government's ultimate goals is to provide better services for citizens, a suggestion, that the application of m-government should also be examined from users' viewpoint. Therefore, the objective of this paper is to investigate the users' requirements for the adoption of m-government services and positive factors that can contribute to an understanding of citizen intention to adopt these services.

II. MATERIAL AND METHODS

M-government with integrated and customized services represents the advanced e-government services. Implementation and successive upgrading of the m-government follow certain paths, levels of maturity, stages, or phases. Different countries implementing e-government in their ICT framework certainly have different missions and objectives; however, the gradual development of an e-government system in any country follows some unique levels of service maturity for evolution [17]. Each of the service levels represents a different service pattern, different levels of technological sophistication, different stakeholder orientation, different types of interaction, different security requirements, and different

reengineering processes. Table I. shows the basic level model of e-government services.

TABLE I. OVERVIEW OF BASIC MATURITY LEVEL MODELS OF E-GOVERNMENT SERVICES

Source / Level	Access	Interact	Transaction	Integration	Customization
World Bank	Publish	Interact	Transaction		
IBM			Automate Enhance	Integrate	On Demand
Gartner	Presence	Interaction	Transaction	Transformation	
OSN	Emerging	Enhanced	Transactional	Connected	
UN/ASPA	Emerging Enhanced	Interactive	Transactional	Seamless	
Layne & Lee	Cataloguing		Transaction	Vertical integration Horizontal integration	
Siau&Long	Web presence	Interaction	Transaction	Transformation	E-Democracy
Capgemini	Information	One-way interaction	Two-way interaction	Transaction	Targetisation

Sources: [2], [17], [21], [14], [5], [21]

All of these models expect the advanced services requiring progressive technology, which will provide e-government to their users - citizens and businesses. Especially citizens' behaviour, in terms of adopting a new technology-driven system, is a very complex and robust subject. The problem with measuring of the success of e-government is described for example in [10]. Understanding and estimating the effect of citizens' adopting criteria, which leads to successful implementation of m-government, would have important managerial implications.

The concept of connected government looks towards technology as a strategic tool and an enabler for public service transformation, innovation and productivity growth.

M-government as a part of e-government is not only adoption of mobile technologies, it is also providing new choices for communication and access channels to citizens, including new social media applications and options [15]. So, as well as e-government services, m-government services can be divided into four levels:

- Information applications - created purely to provide information. This is a one-sided presentation of an office's information resource. Examples include mobile apps that replicate the content of the authority web site, or an services to find the nearest authority office.
- Interactive services - can provide some more or less personalized service for the user. An example is signing into waiting list or preparation of the claims based on fulfilled data about current life situation.
- Transactional services and applications for electronic submission - allow users to prepare, fill in and trustfully submit a form with any request or submission.

Examples are applications for filling out forms or for filling in and submitting a tax return.

- Governance and citizen engagement – services and applications for mutual communication between citizens and government. An example might be an application for reporting the current traffic situation or all the tools of social participation created in the traditional internet apps for social networking.

A. The Technology Acceptance Model

To design and to deliver m-government services, authorities should consider the expectations and the perceptions of citizens toward using the services.

There are several studies dealing with adoption of m-government [3], [9], [11], [18] which indicates that whether or not citizens adopt m-government services is influenced by the following beliefs:

- perceived ease of use; efficiency in time and distance; value for money; convenience; availability of device and infrastructure; usefulness; responsiveness; relevance, quality and reliability of information; risk to user privacy; reliability of the mobile network and the SMS-based system; risk to money; compatibility;
- trust in the mobile service technology, in the government and perceived quality of public services;
- self-efficacy in using mobile technology.

The Technology Acceptance Model (TAM) model was chosen for the purpose of this study as one of the best-describing models from theory of information systems, which explains how users accept and use new technologies. TAM is one of the most important expansions of the original Ajzen&Fishbein's Theory of Reasoned Action (TRA) [1]. Both models - TRA and TAM - contain elements strongly affected by behaviour. The TAM model shows that if a user meets new technologies, there are a number of factors affecting decisions about how and when to use them. Many input factors of the TRA model are replaced by two factors [7] only:

- perceived usefulness - the degree to which a person believes that using a particular system would enhance his or her job performance,
- perceived ease of use – that is the degree to which a person believes that using a particular system would be free of physical and mental efforts.

The proposed m-government services adoption model is based on the original TAM model, which we transform in the first step into a simple CLD diagram using a feedback loop – Figure 1.

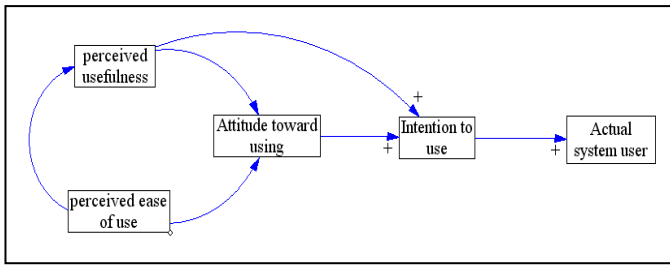


Figure 1. Transformation of the original TAM model into a CLD diagram (modified by [8])

III. RESULTS AND DISCUSSION

The aim of public administration should be to offer services in such forms and quality that customers expect, which they are used to from, for example e-commerce services. The user's satisfaction with the service is an important indicator for determining whether users would return and continue in using the provided online service. The user's satisfaction is one of the subjective qualitative metrics dealing with issues that are more general and related to perceptions and attitudes (e.g. perceived ease of use, usability, etc.).

A. Criteria for the assessment of user satisfaction in m-government services

To determine a set of criteria evaluating the users' satisfaction with provided mobile services is quite a challenging task. It is hard to decide what individual users consider to be important, what their initial knowledge about the use of the Internet is, or what experience with the public administration services they have. Verdegem's study [22] summarized the basic indicators that have a fundamental impact on the users' satisfaction into three groups: accessibility (the service must be easily available without complicated searching), ease of use, and efficiency when users preferred lowering of the administrative burden. Tinholt [18] develops evaluating of the efficiency into criterion of the efficiency to meet the expected benefits. In contrast, Gouscos et al. [8] add to these subjective criteria an objective criterion of time and error rate. And even though these indicators belong rather to the lower layers of the e-services quality evaluation, as shown in the previous charts, these factor significantly influence the perception of the system reliability which has a direct impact on satisfaction.

The objective is therefore to define the key benefits of electronic public administration services, which are expected by the user based on their previous experience, for example with e-commerce services, and which therefore appear as fundamental evaluation criteria of their satisfaction. The essential expected benefits of m-government services based on previous models and studies mentioned above include the following user requirements:

- simpler services – the perception of the service simplicity is mainly based on:
 - ease of use - service usability evaluation,
 - services availability - whether and what additional documents, information or materials (including electronic signature) are required for the use of the service,
 - technical support - whether there is for example hotline, FAQ, etc.,
- faster services – the speed of service depends on:
 - speed of service search
 - speed of data entry / sending electronic reports - how much time is required for complete service processing,
 - speed of system response,
- more efficient services - efficiency perception is particularly based on:
 - usability of services - what is the portion of users able to use the e-service,
 - quality of information - whether the website offering the service gives all the information necessary for its use,
 - error rates of services - frequency of errors during data entry/ sending electronic reports.

B. Factors affecting user's satisfaction with eGovernment services

All of these criteria mentioned above can usually be monitored using several rating systems and evaluation logic, for example through user questionnaires. Continuity of individual factors affecting the user's satisfaction with public e-services is expressed in Figure 2 with Basic casual loop diagram representing "mind maps" for visual mapping of interrelations between various factors that enter the system.

The proposed diagram of m-government services is based on e-government Adoption Model (GAM) [17] and on the model evaluating user satisfaction with the use of e-commerce services [4], because as also the user of m-government services is the customer for public administration and expects a certain quality, which they are used to from the commercial sector. The website quality a can significantly affect the satisfaction and it is one of the factors influencing the intention to purchase goods. The chart presents a position of website quality and value of provided information which certainly influence the overall evaluation of the service. Another depicted factor - service availability – affects interest in offered services and the number of new people interested in using this services. Also feedback captured in the chart explains how positive assessment affects the number of new users or regular users of these services.

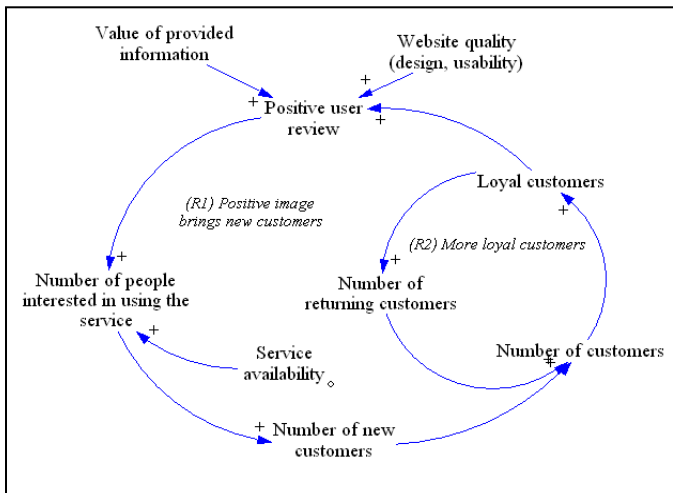


Figure 2. Impact of user satisfaction on the number of service users

The following model Figure 3 is extended by a new variable – perceived reliability. Besides objective factors such as system response speed or service error rate perceived reality of the system is also affected by the subjective expectations on service quality. It is a very subjective viewpoint influenced by previous experience with the use of other electronic services in the business sector. In recent years, it has been possible to observe a gradual decrease of the satisfaction with the offered services caused by rising expectations from offering new ICT technologies [18]. At the same time, we can see that high expectations with the lack of quality (information, website, services) can reduce user's satisfaction. The main problem is that a reduction in only one of these aspects of quality can reduce overall user's satisfaction.

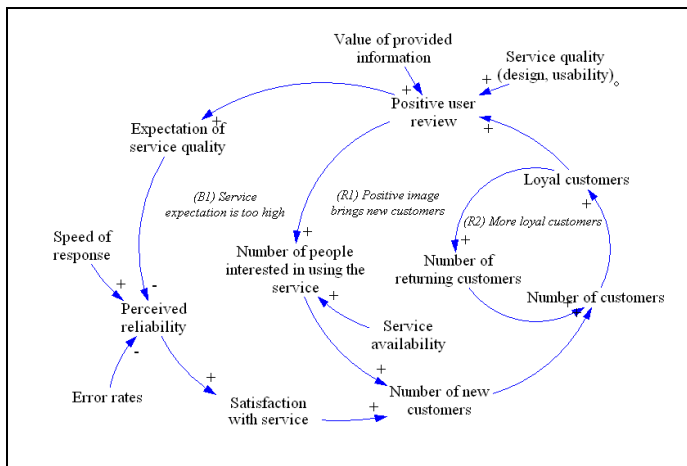


Figure 3. Impact of service expectation on user satisfaction

IV. CONCLUSION

Obviously, one research study such as this one cannot cover all topics in m-government user acceptance. This paper

proposes an m-government adoption model based on original TAM model extended by factors affecting m-government customers' behavior. Hence, there is a room to pursue further research, which should be conducted with more dimensions, depending on the research goals.

The outcome model of this study can help the government officials to understand the needs of the users and to implement the m-government services that will be more urgent and efficient.

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