# Mobile User Needs: Efficient Transactions

Tarek El-Kiki
*Faculty of IT, University of Technology Sydney*
*PO Box 123 Broadway 2007* Australia

Elaine Lawrence
*Faculty of IT, University of Technology Sydney*
*PO Box 123 Broadway 2007* Australia

## Abstract

*Success or failure of any mGovernment mobile service project is decided by the effectiveness of the service itself. This paper is one of a series of four papers investigating mobile user needs in a current research project that endeavours to measure the effectiveness of mGovernment services. In order to achieve as precise a measurement as possible, mobile services are analysed from the perspective of the mGovernment users. Mobile-user-centric mGovernment makes satisfying citizen and business needs the centrepiece in its planning so as to create communities of networked users, not just portals, for individual users. Hence, this paper analyses part of a real-world opinion survey, extracting facts that are used as metrics to measure the effectiveness of existing or proposed mServices.*

**Key Words**- mGovernment, effectiveness, evaluation, mobile, services, systems, management.

## 1. Introduction

Electronic Government (eGovernment) involves the automation or computerization of existing paper-based procedures that is prompting new styles of leadership, new ways of debating and deciding strategies, new methods of transacting business, new techniques for listening to citizens and communities, and new strategies for organizing and delivering information [1]. Mobile Government (mGovernment) may be viewed as a subset of eGovernment. It stands for the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms [2]. On the other hand, mGovernment should not be viewed as a new type of government, rather a new 'tool' for government. Mobile communications and Internet technologies are enabling access to new eGovernment services at anytime and from anywhere. In order to decide the success and failure factors of any mGovernment service project, service engineering has to cope with the requirements of the individuals, and sometimes the conflicting interests of particular roles of involved government officials [3]. Accordingly, based on the effectiveness evaluation study by the authors [4], this paper elaborates on the "Efficient Transactions" as one of four dimensions controlling mobile users' satisfaction.

This paper, therefore, reports on the mobile end user's quantitative and qualitative data collected from a web based anonymous survey. Section 2 provides the background to the Mobile- user's needs and benefits, and Section 3 contains the methodology and the theoretical underpinning of the research. Demographic data are found in Section 4. The survey results are discussed in Section 5, and the conclusion and details of further research are found in Section 6.

## 2. Background on mobile-user's needs and benefits

User's satisfaction and usage have been examined by many researchers in the IT, IS and Networking fields and may be defined as the extent to which users believe that the available service meets their needs. Davis [5] defines perceived usefulness of a service as "the degree to which a person believes that using a particular system would enhance his or her job performance". One year later research by Conrath & Mignen [6] suggested that the impact of user expectations should be considered when assessing user satisfaction. Further attempts were made to capture the overall post hoc evaluation by mobile users concerning the use of an Information System (IS) coupled with antecedent factors that form such satisfaction [7-9].

More recent research [10] defined nine generic customer service dimensions in a model to be used to assess all types of internal and external customer services and their satisfaction. These dimensions are Access, Choice, Courtesy, Knowledge, Quality, Recovery, Reliability, Tangibles and Timeliness as seen in Figure 1. These items were examined in more detail in [11]
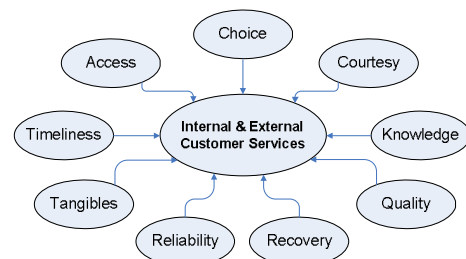


**Figure 1: Generic Customer Service Dimensions Model Source: [10]**

Two years later, Centeno et al. [12] identified three trends in public needs for eGovernment services, namely

needs related to: service provision, service delivery, and service access; where each trend had its related needs. The authors [13] classified those needs according to the originating back and front offices. These authors also developed the "Mobile-User Satisfaction and Usage Analysis Model of mGovernment Services" which is the practical implementation of the theoretical $MPE^2M$-mG (Multi-Perspective Effectiveness Evaluation Methodology for mGovernment) methodology [4]. It represents a methodology to translate mobile-user's goals into metrics which are the core elements sought and used when (re)engineering a mobile service.

It is worth noting that some of mobile-user's benefits are also referred to by some eGovernment researchers as 'opportunities'. For example, Ndou [14] considers reducing the bureaucracy, offering round the clock accessibility and fast and convenient transactions as opportunities for eGovernment to enhance the quality of services in terms of time, content and accessibility. On the other hand, despite the fact that end users' goals or benefits are seamlessly interrelated and cannot be significantly separated from each other, the mobile-user satisfaction and usage analysis model is used to classify

In this research, mobile users are citizens and businesses using the mService and includes core, regular and sporadic users. It concentrates on the users of the mService rather than its maintainers or administrators at the back office as explained in an earlier paper by the authors [11]

$MPE^2M$-mG collates the concepts of Goal/Question/Metric or GQM [15] and Balanced Scorecard Approach or BSA [16]. Table 1 reflects the GQM conceptual level represented in goals as viewed from citizens and businesses perspectives as consumers of mService, where active users are those who are aware of and used one of those mServices, and passive users are those who may not be aware of or used any mService.

## 3. Methodology

This paper represents the sixth stage in our research of the success and failure factors of mGovernment service projects initiated by the devised generic mGovernment framework [17]. The focus of our initial literature review concentrated on existing studies that handled mGovernment user's topics. Academic databases, mainly
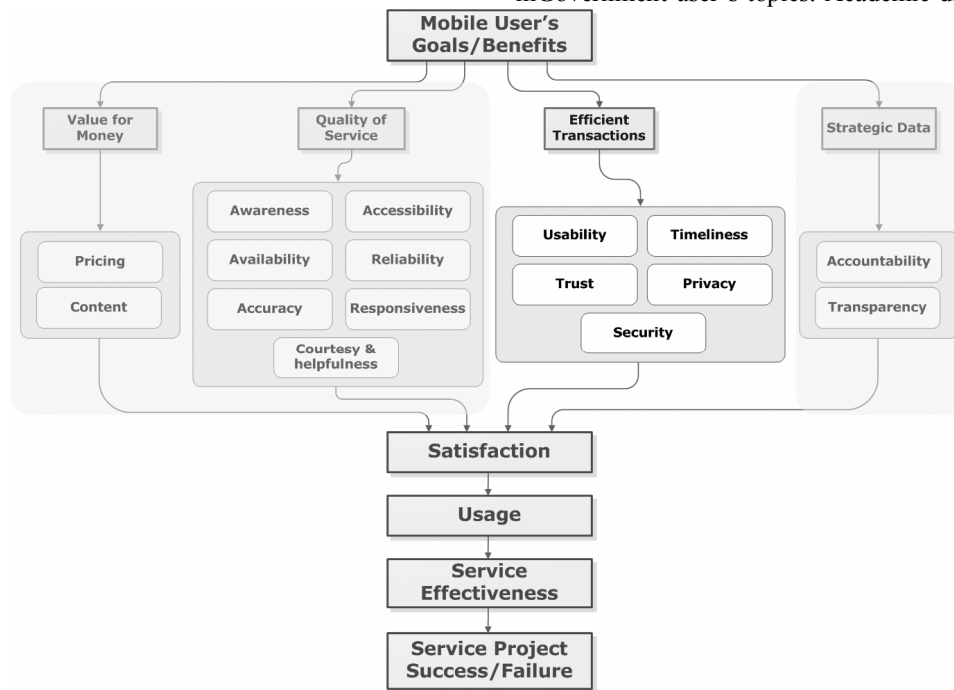


**Figure 2: Mobile-user's Benefits from mGovernment Services**

them into four groups: Value for Money, Quality of Service, Efficient Transactions, and Strategic Data as per Figure 2. The focus of this paper is on the first group; Value for Money, as perceived by mobile end users who participated in a real-world online survey studying those users' needs and goals for a government service rendered via mobile technologies (mService).

Proquest, Computer and Information Systems Abstracts (CSA), ACM Digital Library and IEEE Explore were consulted. As mGovernment is a new but growing area of research, as evidenced by having its own international conference as well as specialized tracks in other international conferences, exploratory research is a legitimate methodology [18]. Such exploratory research assists in establishing the theoretical foundation for

sourced from different areas such as communication companies, mobile phone suppliers, application developers and consultants. The researchers also attended eGovernment and mGovernment conferences and trade shows to source likely experts. As Zmijewska & Lawrence [24] stated, such stakeholders, due to their first-hand experience, are likely to know exactly what helps and hinders successful diffusion of mobile government.

**Table 1: Efficient Transaction Questions, adapted from [4]**

| GQM / BSA | Conceptual Level | Operational Level | Qualitative & Quantitative Level | |
|---|---|---|---|---|
| Persp-ective | Goals | Indicator Domains | Active Mobile Users Statements | Passive Mobile Users Statements |
| Citizens / Businesses | (3) Efficient Transactions | Usability | ➢ I understand how government mobile services work. ➢ I consider government mobile services are easy to use. ➢ It was not difficult learning how to use government mobile services. ➢ I find it easy to understand the language of government mobile services. | ➢ I expect to understand how government mobile services work. ➢ I expect government mobile services would be easy to use. ➢ I assume it would not be difficult learning how to use government mobile services. ➢ I expect the language of government mobile service to be easy to understand. |
| | | Timeliness | ➢ I get the information I need in time through government mobile services. ➢ I am provided with up-to-date information when using government mobile services. | ➢ I expect to get the information I need in time through government mobile services. ➢ I expect to be provided with up-to-date information when using government mobile services. |
| | | Trust | ➢ I have full trust in government mobile services. | ➢ I should have full trust in government mobile services. |
| | | Privacy | ➢ I feel confident about my privacy protection when using government mobile services. | ➢ I should feel confident about my privacy protection when using government mobile services. |
| | | Security | ➢ I feel my transaction is secure when using government mobile services. | ➢ I assume that my transaction is secure when using government mobile services. |

Operationalization of the goals constructs was largely based on questions used in prior studies with minor modifications to fit the context of mGovernment service end users. Additional open questions regarding their views about mServices were developed based on the literature review and experts' survey

further examination and has been vital in developing a viable, theoretical framework. To proceed with this study, the case study method was chosen [19] where data are gathered through structured interviews and surveys [20].

Structured interviews are used with local government officials whilst surveys are used with mobile users as they are defined in the previous section. In fact, this methodology has been utilized by other researchers [21, 22] in similar studies.

In order to list most of mobile users' goals, needs and benefits, and, therefore, to classify them in homogenous groups, an extensive review of literature was conducted. Verifying the reality and practicality of those groups necessitated soliciting other researchers and industry experts' opinions through another web-based survey [23]. Researchers and academics were seen as an important source of knowledge as their work requires familiarity with all the developments in the field [24]. The selection criterion for researchers and academics was at least one peer-reviewed journal or conference publication regarding mobile and electronic government. Industry experts were

findings. Needs and expectations items were measured on a one-to-five Likert scale ("not at all true" to "very true"). The instrument was then subjected to a pre-test procedure where selected individuals – five academics from Australia and seventeen potential respondents – were invited to complete the survey and provide comments for its refinement.

## 4. Demographic data

Sample descriptives indicate a strong domination of mobile device use by men (90%+) who made up the highest number of participants. Additional sample characteristics reflect a bias to young (<18 – 34) who represented 93%, and tertiary educated participants who represented over 86% and have been documented as being more likely to adopt and use mobile technology innovations. Most of respondents (77%) are earners with incomes from $10,000 - $70,000 p.a. – more biased towards low and middle income earners in communities. Lastly, active users represented 6.5% whilst passive users

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were 93.5% of the sample covered. The fact that 63% had never heard of mServices illustrates that mGovernment services are still in their infancy in terms of public consciousness.

## 5. Discussion of Efficient transactions

Any online government service and/or transaction must be secure and private. When deciding whether a mobile payment service is efficient; users will consider the following: Is this mobile transaction system easier, faster and better than conventional payment methods? As for mServices in particular these five elements or indicators [11] play even more significant roles in making a transaction efficient: Usability, Timeliness, Trust, Privacy, and Security.

Table 1 outlines each indicator's construct and its statements that investigated the needs and expectations of both active and passive users. Each type of users had its own set of statements which differed grammatically and contextually from the other. For example, one of the statements investigating usability from an active user perspective stated:

- I **understand** how government mobile services work.
  Whereas a passive user's statement stated:
- I **expect to understand** how government mobile services work.

### 5.1 Usability Indicator Construct

The simplicity or complexity of the system rendering the service is a significant determinant of either an efficient or inefficient transaction [25]. Accordingly, in order to accurately define the simplicity or complexity of an mService, mobile users needs have to be investigated. This is particularly important when related to mobile devices which have small screen real estate and awkward input procedures.

A usability construct which examines both active and passive users' views concerning its elements, revealed that over seventy-five percent (75.30%) of users agreed that ease of a) use, b) learning c) understanding is essential for the success of the service as shown in Table 3. Our survey confirmed that usability of the service is a significant element in making an mService transaction efficient.

### 5.2 Timeliness Indicator Construct

Service timeliness is when the service is delivered by the expected or promised time and does play an important role in the government to citizen (G2C) relationship [11]. The timeliness construct investigates the importance of mService promptness and the originality of information provided as viewed by both active and passive users. As

shown in Table 3, over seventy-one percent (71.36%) of participants agreed that mServices should be rendered and accessible whenever they are needed. Respondents also required the most up-to-date information through such service. Hence, timeliness is considered to be a significant element in making an mService transaction efficient.

**Table 2: Survey Demographic Data**

| Descriptors | Classes and Ranges | Active Users | Passive Users |
|---|---|---|---|
| Gender | Men | 7.37% | 92.63% |
| | Women | 2.44% | 97.56% |
| Age | <18 | 5.26% | 94.74% |
| | 18-24 | 8.47% | 91.53% |
| | 25-34 | 3.23% | 96.77% |
| | 35-49 | 12.50% | 87.50% |
| | 50-65 | 0.00% | 100.00% |
| Education | High School | 0.00% | 100.00% |
| | Vocational/Trade School | 0.00% | 100.00% |
| | Bachelor's Degree | 5.56% | 94.44% |
| | Master's Degree (MSc, MA, MBA) | 4.88% | 95.12% |
| | Doctorate Degree (PhD) | 16.67% | 83.33% |
| Income | $10,000 - $30,000 p/a | 2.17% | 97.83% |
| | $30,000 - $50,000 p/a | 3.13% | 96.88% |
| | $50,000 - $70,000 p/a | 10.00% | 90.00% |
| | $70,000 - $90,000 p/a | 10.00% | 90.00% |
| | $90,000 - $110,000 p/a | 14.29% | 85.71% |
| | Over $110,000 p/a | 20.00% | 80.00% |
| Awareness of Government mobile Services | Less than 6 months ago | 0.00% | 100.00% |
| | 6 to 12 months ago | 30.00% | 70.00% |
| | More than 1 year ago | 10.00% | 90.00% |
| | More than 2 years ago | 22.73% | 77.27% |
| | I have never heard of mobile government services | 0.00% | 100.00% |

### 5.3 Trust Indicator Construct

Trust has been known as a critical success factor of eCommerce & mCommerce, and has received significant attention in private sector eCommerce research. Lack of trust in online entities can prevent users from providing personal information [26] and hinder adoption of eCommerce [27]; mobile users in this regard are not different. Mayer et al. [28] define trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party". Dietz [29] reported that a group of Mobile Network Operators have joined the Liberty Alliance, 'which standardizes identity management functionalities bridging mobile and

**Table 3: Collected end-users' opinions per construct**

| Construct | Users' Responses | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree | Summary Graph |
|---|---|---|---|---|---|---|---|
| **Usability** | Active | 0.00% | 70.00% | 20.00% | 6.67% | 3.33% |  |
| | Passive | 20.37% | 55.35% | 19.06% | 4.18% | 1.04% | |
| | Total | 18.89% | 56.42% | 19.13% | 4.36% | 1.21% | |
| | **Summary** | **75.30%** | | **19.13%** | **5.57%** | | |
| **Timeliness** | Active | 0.00% | 56.25% | 25.00% | 12.50% | 6.25% |  |
| | Passive | 23.16% | 49.47% | 20.00% | 6.32% | 1.05% | |
| | Total | 21.36% | 50.00% | 20.39% | 6.80% | 1.46% | |
| | **Summary** | **71.36%** | | **20.39%** | **8.25%** | | |
| **Trust** | Active | 0.00% | 25.00% | 12.50% | 50.00% | 12.50% |  |
| | Passive | 12.37% | 23.71% | 42.27% | 16.49% | 5.15% | |
| | Total | 11.43% | 23.81% | 40.00% | 19.05% | 5.71% | |
| | **Summary** | **35.24%** | | **40.00%** | **24.76%** | | |
| **Privacy** | Active | 0.00% | 37.50% | 25.00% | 25.00% | 12.50% |  |
| | Passive | 14.43% | 22.68% | 28.87% | 22.68% | 11.34% | |
| | Total | 13.33% | 23.81% | 28.57% | 22.86% | 11.43% | |
| | **Summary** | **37.14%** | | **28.57%** | **34.29%** | | |
| **Security** | Active | 0.00% | 25.00% | 18.75% | 6.25% | 50.00% |  |
| | Passive | 15.63% | 30.21% | 34.38% | 14.58% | 5.21% | |
| | Total | 13.39% | 29.46% | 32.14% | 13.39% | 11.61% | |
| | **Summary** | **42.86%** | | **32.14%** | **25.00%** | | |

Internet, turning the mobile devices into trusted, mobile passport-like devices'.

The trust indicator in our survey tests how much trust an end user has in government mobile services. One statement investigated full trust in mServices. As classified on the one-to-five Likert scale, answers show nearly twenty-five percent (24.76%) of end users have no trust in mobile government services; this is in addition to forty percent (40.00%) of users who have not declared their opinions, which is still considered not in the favour of the trust in mServices. On the other hand, thirty-five percent of end users agreed that they have, or should have, full trust in mServices. It is worth mentioning, though, that none of the active users has strongly admitted full trust in mServices as shown in Table 3. In conclusion, this indicator highlights a shortage of end users' trust in mServices and, accordingly, negatively affects transactional efficiency for government services.

## 5.4    Privacy Indicator Construct

Privacy is defined [30] as "the right to be left alone and to control the conditions under which information pertaining to you is collected, used and disseminated" . If users' privacy is not protected when using a mobile service, they simply will not use it again, making it very difficult to achieve critical mass. Users are becoming more aware of privacy issues and comparing the privacy policies of government sites with those of the private sector. As outlined by Ng-Kruelle et al. [31] a serious concern for the concept of "location/context awareness" is the confidentiality of information concerning a person's position. Indeed "Misuse could lead to increased intrusion on privacy by exposing an individual's real-time movements with possible negative implications." Citizens would normally react badly to such surveillance of their movements by a government although this positioning ability is enabled so that emergency services can locate mobile phone users.

The privacy Indicator tests the degree of confidence in privacy protection when utilising mServices. Over thirty-four percent (34.29%) of both active and passive users declared that their privacy is not (or would not be) protected when utilising mobile services, whilst over twenty-eight percent (28.57%) preferred selecting the uncertain option. In contrast, slightly over thirty-seven percent (37.14%) declared (or assumed that there should be) confidence that their privacy is protected when utilising mService as shown in Table 3. Hence, the Privacy Indicator highlights a shortage of end users'

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confidence in mServices privacy protection and this, accordingly, negatively affects the transactional efficiency of such types of government services.

## 5.5 Security Indicator Construct

Security is protection from intended and unintended breaches that would result in the loss or dissemination of data [32]. Security is not just about installing the latest security devices and deploying the most modern security technologies. Information security is a combination of business, management and technical measures on an ongoing basis. In a 2005 study by Quocirca, two thirds of IT professionals rated data falling into the wrong hands by theft or loss of a device as the most important mobile security issue [33]. If the material contained mobile voting records, the effect could be catastrophic for governments.

The security Indicator tests how end users feel towards the security of the mServices once they are used and depended on. Twenty-five percent (25.00%) of both active and passive respondents disagreed that their transactions are (or would be) secure when utilizing a government mobile service, whilst nearly one-third of participants were uncertain (32.14%). Although about forty-three percent (42.86%) of respondents agreed with the security statement, nearly one third of them had really used an mService whilst the other two thirds classified themselves as passive users expecting or assuming to have secure transactions when using mServices. This emphasises the fact that end users, active or passive, have some doubts about current mServices security especially when none of the active users had "strongly agreed" to this indicator's statement. Accordingly, this agreement percentage could realistically be even lower.

Concluding this point, it can be deduced that although it may seem that the security element did not gain much approval from end users, it still reflects the security gap in mServices transactions. Hence, we conclude that security is an essential element in making mServices transactions efficient.

## 6. Conclusions and future directions

This paper presented the sixth stage in an ongoing research on the effective mobile government's services. It reports specifically on the findings of a current survey of mobile end-users' needs and expectations in utilising a government mobile service. The survey has attempted to practically investigate and understand the real-world mobile end-users' opinions about a rendered government service via mobile technologies. The majority of respondents agreed that usability and timeliness are significant components for efficient mService transactions. On the other hand, the relatively small approval given to the significance of trust, privacy and

security reflects end users' suspicion and lack of information about these topics when they are applied on a service rendered by the government. On the contrary, it affirms the need to reveal up-to-date facts about privacy and security to end users, in order to gain their trust in any rendered mService. This survey is based upon a theoretical devised model that analyses mobile user requirements to their main components, where efficient transactions represent one of the goals of GQM conceptual level. Further studies will handle the analysis of the rest of survey goals. The results will contribute to the next stage into the authors' investigation of effective mobile government services in search of the factors that controls an mService project's validity.

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