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Social acceptance of location-based mobile government services for emergency management

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ABSTRACT

Location-based services deployed by governments can be used to assist people manage emergencies via their mobile handsets. Research delineating the acceptance of public services in the domain of emergency management has been scantly investigated in information systems. The main aim of this study is to assess the viability of location-based mobile emergency services by: (i) exploring the issues related to location-based services and their nationwide utilisation for emergency management; (ii) investigating the attitudinal and behavioural implications of the services; and (iii) examining the social acceptance or rejection of the services and identify the determinants of this acceptance or rejection. The results reveal that both attitude and perceived usefulness demonstrate a good prediction power of behavioural intention. Although perceived ease of use was found not to be a predictor of attitude, the results affirm its influence on perceived usefulness. The results also demonstrate the role of trust as the most influential determinant of individual perception of the usefulness of the services. Further, the results indicate that only the collection of personal location information, as a perceived privacy concern, had a significant negative impact on trust. Implications and future research are also discussed.

1. Introduction

Emergencies and disasters have been part of our existence since the recording of history and will always be part of the continuing cycle of life and death. The 2001 terror attacks on New York City, the 2004 Indian Ocean Tsunami, the 2010 Haiti earthquake, and the 2012 Hurricane Sandy in the United States and Canada are just a few telling examples of what societies can endure. According to the United Nations' International Strategy for Disaster Reduction Platform (2005), one of the main reasons for the loss of life in an emergency event is lack of early warning information. Therefore, in response to the lack of timely information, governments around the world have been exploring mobile phones as an additional feasible channel for disseminating information to people in emergency situations. The Short Message Service (SMS) and the Cell Broadcast Service (CBS) currently represent the feasible services that could be utilised for geo-specific emergency purposes as they can operate with almost all kinds of mobile handsets available today (Aloudat and Michael, 2010). We call such a service "location-based mobile government service for emergency management".

Samsioe and Samsioe (2002) argued that an electronic service that has location capabilities should be able to fulfil the following three separate activities so as to be accurately defined as a location-based service (LBS): (i) estimate the location of the device; (ii) produce a service based on the estimated location; and (iii) deliver the location-enhanced service to that

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device. Accordingly, location-based services (LBS) for emergency management would involve the following: first, the location of the mobile handset can be estimated by using Cell-ID related technologies (Spiekermann, 2004); second, the mobile telecommunications network can produce an emergency information service, formed as an SMS or CBS, on events such as fire, flood, heavy rain, or hurricane, around the estimated location; and third, the warning message can then be sent to mobile handsets in the vicinity of the emergency to alert people.

After examining the related literature, it is clear that there is a marked scarcity of theoretical and empirical research that touches on the issues pertaining to the nationwide deployment of LBS for emergency management by governments. Furthermore, early studies have neglected the assessment of the acceptance and adoption of these services, along with their determinants, in the public domain. Accordingly, we seek to fill this gap by assessing the viability of location-based mobile government services within the national emergency management arrangements; Australia as a case study. To achieve this, we aim to investigate the social acceptance or rejection of location-based mobile government emergency services in Australia and identify the determinants of the acceptance or rejection.

The rest of this paper is organised as follows. Section 2 reviews the existing literature on the issues related to utilising LBS for emergency management. Section 3 develops a research model that demonstrates the acceptance of the services and their determinants. Section 4 describes the research method applied in this study. Section 5 reports the data analysis conducted to test the research model and Section 6 provides a discussion of the results. The contributions and limitations of this study and directions for future research are discussed in Section 7.

2. Issues related to LBS and emergency management

2.1. Visibility of LBS as a solution for emergency management

An individual may not be aware of the possible utilisation of location-based mobile phone services for emergency management and, therefore, it could be argued that the direct advantages or disadvantages of such utilisation would not be visible to him or her (Karahanna et al., 1999; Kurnia and Chien, 2003). An early explanation of these common phenomena came from Zajonc (1968) who defined it as the "mere exposure effect". This describes the case where a person does not know or has little knowledge about a phenomenon, but by repeatedly exposing him or her to related stimulus objects, the repetition is capable of changing his or her beliefs towards the phenomenon either positively or negatively.

One of the key attributes of the Diffusion of Innovation (DOI) Theory by Rogers (1962) is *observability*, which was later segmented by Moore and Benbasat (1991) into two distinct constructs of *demonstrability* and *visibility*. The interpretation of *visibility* surmises that an innovation may not be new, but its benefits could be unknown to the public or even to governments. This is probably the case with LBS where these services have been available for several years, yet their general usage rates, specifically in the domain of emergency management are still extremely limited worldwide (Frost and Sullivan research service, 2007; O'Doherty et al., 2007; Aloudat and Michael, 2011).

2.2. The quality features of location-based emergency services

Service quality is defined as "a global judgement, or attitude, relating to the superiority of the service" (Parasuraman et al., 1988, p. 16).The quality of a service is, therefore, a result of subjective understanding, evaluation, and judgement of its merits. This understanding could, unfortunately, raise several judgement-related issues regarding the desired features of a service. Such issues could be easily augmented in the world of electronic services (e-services), such as LBS, especially in the absence of widely accepted and reliable instruments to quantifiably measure the quality features of an e-service. As a direct result of the absence of "agreed-upon" e-service quality models for all kinds of e-services, researchers have been compelled to use traditional service quality scales, such as the SERVQUAL model of Parasuraman et al. (1988), to measure the quality features of e-services (Liljander et al., 2002). In these traditional models however the interpersonal character of the delivery has the main impact on determining the quality of the service and, therefore, such models cannot truly be applied to the paradigm of e-services (Boshoff, 2007). Several studies suggested alternative instruments to measure e-service quality. Examples include Kaynama and Black (2000), and Zeithaml et al. (2000, 2002). But, Boshoff (2007) strongly argued that most of these proposed instruments had flaws since they were either too narrowly focused on a specific kind of e-services or failed to address the e-service from the perspective of the medium through which the service is provided or delivered.

In general, the quality of an e-service has been discerned as a multifaceted concept with different dimensions proposed for different service types (Zeithaml et al., 2002; Zhang and Prybutok, 2005). Unfortunately, in the context of LBS there is no existing consummate set of dimensions that can be employed to measure the quality features of the services and, subsequently, to measure their impact on an individual's opinion about the utilisation of the services for emergency management. Therefore, defining a dimensional measurable set for location-based mobile phone emergency services would not be a straightforward task since there is almost no scholarly research regarding such a set. Nonetheless, the quality dimensions of a location-based mobile phone service that are expected to be relevant to emergency situations were adapted from Liljander et al. (2002), but were revised to accurately reflect the quality measurements of LBS in their new context (i.e. emergency management). The dimensions include *reliability*, *responsiveness*, *customisation*, *assurance/trust*, and *user interface*.

The interpretation of the *reliability* concept follows Kaynama and Black (2000), Zeithaml et al. (2002)