Chapter 5.10
Determinants of User Acceptance for RFID Ticketing Systems

Dimitrios C. Karaiskos
Athens University of Business and Economics, Greece

Panayiotis E. Kourouthanassis
Athens University of Business and Economics, Greece

ABSTRACT

RFID ticketing systems constitute a particular type of pervasive information systems providing spectators of sports events with a transparent mechanism to validate and renew tickets. This study seeks to investigate the factors that influence user acceptance of RFID ticketing systems. The theoretical background of the study was drawn from the technology acceptance model (TAM) and the innovation diffusion theory (IDT), and enhanced with factors related to privacy and switching cost features. The research model was tested with data gathered through a lab experiment (N=71). The participants perceived the system as useful and easy to use, and expressed the willingness to adopt it should it become commercially available. Moreover, the results of ANOVA tests suggest that the age and education of users influence their perception towards the usefulness of the system and its subsequent use.

INTRODUCTION

The advent of mobile and wireless technologies such as Wi-Fi, ZigBee (Geer, 2006), and RFID (Smith & Konsynski, 2003) have inspired new research fields that challenge our existing view of Information Systems (IS) and their use by envisioning new ways of interacting with them away from the boundaries imposed by the desktop computer. The gradual miniaturisation of electronic components, the massive reduction of their production and operation costs, and their ability to communicate wirelessly, contributed to the design and development of systems that are capable of being embedded in objects, places, and even people (Roussos, 2006). Information Systems scholars have named this new phenomenon using such terms as *nomadic computing* (Lyytinen & Yoo, 2002), *ubiquitous computing* (Weiser, 1993), and *pervasive computing* (Saha & Mukherjee, 2003).

These terms share the common denominator that Information Technology pervades the physical space, operates in the periphery of humans' world, and supports a variety of applications and services in a context-aware and passive manner. Birnbaum (1997) identified these novel characteristics in the IS discipline by defining a new IS class entitled *pervasive information systems (pervasive IS).*

Pervasive IS may support both personal and business activities. Kourouthanassis and Giaglis (2006) provide a taxonomy of pervasive IS and their features by identifying four pertinent application types--personal, domestic, corporate, and public. Personal pervasive IS rely on wearable hardware elements to provide a fully functional computing experience on the direct periphery of the user. Typical examples include biomedical monitoring systems (Jafari, Dabiri, Brisk, & Sarrafzadeh, 2005), human detection systems (Smith et al., 2005), and remote plant operation systems (Najjar, Thompson, & Ockerman, 1997). Domestic pervasive IS primarily automate tasks that otherwise require human supervision in the household (e.g., heating and lightning control, monitoring the home inventory, etc.). Typical examples include MIT's Home of the Future initiative (Intille, 2002) and the Aware Home (Kidd et al., 1999). Corporate pervasive IS may support enterprise-wide activities, such as supply chain management (e.g., warehouse management (Prater, Frazier, & Reyes, 2005)), workforce management (e.g., sales force automation (Walters, 2001)) and office support (Churchill, Nelson, & Denoue, 2003; Greenberg & Rounding, 2001), and customer relationship management (Kourouthanassis, 2004). Finally, public pervasive IS may provide interactive environments in public places. Examples include wireless museum guides (Hsin & Liu, 2006) and mobile information devices in hospitals (Xiao, Lasome, Moss, Mackenzie, & Faraj, 2001) to name a few popular applications.

RFID ticketing systems fall under the umbrella of public pervasive IS by providing spectators of sports events with a technology-augmented method for renewing and validating their tickets. The underlying technology is radio-frequency identification (RFID) which is a generic term for technologies that use radio waves to automatically identify people or objects. The identification process involves the storage of a unique serial number to an RFID tag comprised of a microchip and an antenna. The antenna enables the chip to transmit the identification information to an *RFID Reader*. The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it. RFID technology already has been incorporated in sports tickets over the past few years with the most notable deployment being during the 2006 FIFA World Cup (Schmidt & Hanloser, 2006). The successful paradigm also has been followed by numerous football clubs in the U.K. such as Fulham, Coventry City, Manchester City, Reading, and Wigan.

The new ticketing scheme promises to bring the advantages of RFID technology to the sports events arena. Tickets incorporating the RFID technology have added value credited to the technical capabilities of RFID which are wireless connectivity, persistent memory, and computing power. In particular, a RFID-enabled ticket contains a microprocessor which allows encryption methods to be applied in order to be uniquely authenticated, thus, discouraging incidents of forgery, counterfeiting, and replication. Furthermore, the RFID-enabled ticket has the ability to store data regarding service details and owner's personal data, making possible the unique identification of the owner and the provision of added value services to him. Also, the wireless connectivity of the ticket allows its owner to pass control gates faster and to be more easily located for security reasons.

Although RFID tickets represent an excellent balance between cost, security, and access control, issues of reliability and durability have been received with scepticism due to their feature of

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