



Predicting personal information system adoption using an integrated diffusion model



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ABSTRACT

The purpose of this study is to develop a research model that integrates the relationship between innovation characteristics (innovation diffusion theory) and technology characteristics (task-technology fit model). With the research model, the current study investigates the adoption of the “personal information system,” a concept that we develop in the context of mobile technologies. In this paper, we performed the first quantitative test of the model by integrating the innovation diffusion and task-technology fit models. Further, we proposed a theoretical definition of “personal information systems” by highlighting the differences in the types of tasks across individual users’ needs. To test our research model, 202 college students were surveyed. Partial least squares (PLS) structural equation modeling was employed to analyze our data, and these analyses provided empirical support for the proposed hypotheses. Quality, compatibility, cost, and relative advantage were found to be important indicators of the intention to adopt due to their impact on the intended communication, information, transaction, and entertainment tasks, while compatibility, relative advantage, and complexity had a direct impact on the intention to adopt.

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1. Introduction

In the 21st century, many companies have made large investments to develop new and fast mobile communication devices, and mobile technologies are often touted as the next “killer application.” However, despite the investment and cutting-edge features that are available in mobile devices, most new mobile phone subscribers have adopted low-cost handsets instead of the latest mobile devices. For example, according to the U.S. Census Bureau, only 37% of cell phone users selected a smart phone in 2007; the Census Bureau forecasted this figure to increase by less than 10% in 2008. In this paper, we explore the reasons for these outcomes by adapting organizational-level innovation diffusion theory to the individual, or personal, level and develop an alternative conceptualization of mobile devices, that is, we conceptualize these devices as *personal information systems*. The research question that we seek to answer is “What characteristics of personal information systems affect their adoption as innovations?” The intended contribution is a more complete framework for investigating the adoption of personal information systems,

such as hand-held mobile devices, by analyzing user experience and its impact on future usage and by exploring the fit between the intended tasks and the user’s knowledge regarding the characteristics of the technological innovation.

Our research model integrates the relationships between innovation characteristics in innovation diffusion theory and technology characteristics in the task-technology fit model to better investigate individuals’ adoption of mobile devices. We use adoption theories that were originally developed to explain the adoption of innovations by individuals in an organizational context. We argue that the concept of fit is an important factor to consider when explaining the process of innovation adoption.

1.1. Motivation for the study

Our study is motivated by three limitations of previous research on innovation adoption. First, scant research has paid attention to the process of mobile device adoption. Sarker and Wells [54] argue that the first condition of success for mobile commerce is the adoption of suitable mobile devices. They stress that it is important to understand the motivations and circumstances surrounding mobile device use and adoption from the consumers’ perspective. Previous studies have focused on the impact of mobile technology on customers’ adoption [14,22,23,27,28,31,53]. Similarly, a large

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body of mobile technology research has focused specifically on mobile commerce and not on the decisions to adopt mobile devices. We believe that studying the adoption of a “personal information system” is the key to studying the success of mobile commerce and mobile technologies.

Second, prior research has primarily considered mobile devices as a single-function system [14,23,27,31,54]. However, given the multifunctional nature of personal information systems, consumers likely perceive distinct values from different functions such as work-related applications compared with entertainment applications such as games or YouTube. We consider multiple tasks and their corresponding values that individuals derive from the fit between these tasks and the technology offered in the personal information system. In addition, IS literature has called for the reconceptualization of the systems usage construct in different contexts; system usage involves a user, a system, and a task [11]. Thus, we propose four tasks to analyze personal information system use: communication, information, transaction, and entertainment.

Third, previous research has applied innovation diffusion theory and task-technology fit, as developed for organizational information systems [6,48], to explore the processes of individual-level information system adoption without adequately recognizing the level of adoption processes. As Wu and Lederer [64] note, investigating the different roles of the factors that affect adoption in different contexts by developing an integrated framework can help researchers understand the adoption process with innovations in a new context. This is important because we argue that personal information system adoption differs from organizational device adoption, chiefly in terms of the acquisition process. We develop a framework using the concept of the personal information system and use innovation diffusion theory and task-technology fit to explore the adoption and implementation of such systems.

In sum, the current study is motivated by the need to study (1) knowledge about customers' cognitive perspective in the personal information system adoption and implementation process, (2) knowledge about the impact of multifunctionality on the adoption of the personal information system, and (3) knowledge about the research on personal information system adoption and the implementation processes in the context of an individual system. This paper is organized as follows. First, we review the characteristics of mobile technology and define the personal information system based on mobile technology characteristics and tasks. Then, we combine the innovation diffusion theory and task-technology fit models to explain personal information system adoption and develop hypotheses based on this integrated model. Finally, we report an empirical test of this model to address the intention to adopt a personal information system. We conclude with a discussion regarding the contributions of the model and our empirical test and make suggestions for future research.

2. “Personal information systems” and mobile technology

As indicated in the Introduction, we seek to define a “personal information system” to aid in our research into the adoption of mobile devices. Mobile devices have been identified by several names, such as the smart phone. We wish to distinguish the smart phone from other mobile devices on the grounds that a smart phone is an advanced information system that is used by a single user (unique to that device). The smart phone is a hybrid of a cell phone and a personal digital assistant. A smart phone often runs a mobile data services (MDS) application, which is a digital data service that can be accessed using a mobile device over a wide geographic area. Smart phones enable users to communicate with others, just as cell phones do, to exchange multiple messages,

pictures, and e-mail, and to access the Internet. The essential features of these mobile devices are high levels of mobility, accessibility, personalization, and localizability.

2.1. Mobility

Mobility refers to the characteristic of a personal information system that allows users to accomplish the tasks that the system offers, unlimited by the users' physical movements. Mobility consists of two dimensions: spatiality and temporality. Spatiality refers to the unlimited geographical movements of users, resources, and devices, and temporality includes more than the clock-time perspective. Temporality also refers to the “spaceless” nature of mobility, which enables users to reduce the information search time, conduct a transaction or information search unrestricted by location, and conveniently conduct an information search at any time. A small size, being light weight, and always-on operation are necessary for mobility [37] to enable users to carry a personal information system anytime and anywhere [23]. Therefore, users can engage in a wide range of other activities while conducting tasks with the personal information system.

2.2. Accessibility

Accessibility provides time-sensitive and real-time data to users [14,43]. Mobile technologies allow users to have access to timely information and services from any location at any time. This real-time information and these services allow users to make better decisions, thus enhancing the accuracy of information in context [43]. This accessibility also increases the value of personal information systems for information-gathering tasks and results in greater business opportunities. For example, some insurance companies report increasing their revenues by 17–21% after implementing remote access information systems [14].

2.3. Personalization

Personalization refers to devices, applications, and services that are customized to the owner's preference and interests. Because personal information systems typically belong to only one user, the user has exclusive access to his/her platforms. Personalized services increase users' loyalty and satisfaction and make them feel “closer” to personal information systems.

2.4. Localizability

Identifying the geographical position of a device (and, by implication, its user) is a distinctive characteristic provided by a personal information system. This gives service and content providers a chance to deliver localized information and services to users. Personal information systems, which are generally equipped with GPS or similar technology, can use location information to customize the information and service choices offered to the consumer [14,18].

2.5. Definition of personal information systems

The four characteristics of mobile technology are related to each other. When they are synthesized and coordinated, superior mobile services are provided to users. As such, the real-time connection and “everywhere” presence of mobile technology offers capabilities that are uniquely beneficial to each user. In addition, the advantages presented by the omnipresence of real-time knowledge, localized information, and continuous access to networks drive people to communicate with others through mobile devices. Thus, mobile technology-induced advantages have

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