User Acceptance of Mobile Library Applications in Academic Libraries: An Application of the Technology Acceptance Model

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A B S T R A C T

Purpose: The purpose of this study is to investigate factors influencing user acceptance of mobile library applications in academic libraries.
Methodology: A conceptual structural model for user acceptance of mobile library applications, was developed using a technology acceptance model (TAM) as a theoretical background, and used a structural equation modeling with partial least squares (PLS) approach to examine data collected from a survey of 273 undergraduates in an academic library setting.
Findings: The results of this study strongly support the TAM theory to understand user acceptance of mobile library applications. Perceived usefulness, interactivity, and ease of use had significant effects on user attitude and intention to use mobile library applications. Further, user satisfaction had the most powerful effect on intention to use among the constructs included in the model.
Practical implications: The results are of practical significance to all those interested in the mobile library services field, or primarily academic library researchers and library practitioners.
Value: The paper is the first to investigate user acceptance of mobile library services using smartphone applications based on the TAM theory. Simultaneously, the PLS approach used in this study is unique to mobile library services research. The paper, as such, contributes to the methodology development of the mobile library services research field.

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INTRODUCTION

Mobile library services are developing rapidly to meet recent user trends. Concurrent with these library services, academic libraries have built mobile library applications (apps), and provide a convenient way for users to approach a library's services. Users can search a library's catalog, view library events, reserve library facilities, and request interlibrary loan services. In addition, location-based services are also available in mobile library apps. Despite the efforts of libraries, potential users may not use mobile library apps. Given the resources invested in developing systems and improving functional performance, library and information science researchers have noted that digital libraries are often overlooked by students or seriously underutilized in spite of their availability (Thong, Hong, & Tam, 2002). The experience of digital libraries can be projected to mobile library apps. Libraries must accordingly identify critical factors that affect how to stimulate the intent to use library apps.

However, few studies have aimed to investigate the effects of multiple factors on user acceptance of mobile library apps based on the technology acceptance model (TAM). The TAM explores factors that affect

behavioral intentions to use information or computer systems and suggests that two key variables—perceived usefulness and perceived ease of use—determine the intention to use particular systems (Davis, 1986). The TAM has been applied to studies on adoption behavior related to various information technologies and systems. The advantage of applying the TAM to an understanding of mobile library apps in academic libraries is further highlighted from three aspects. First, the model primarily takes users' perspectives into account (Adams et al., 1982; Davis, Bagozzi, & Warshaw, 1989). Designing and building appropriate mobile library apps from users' perspectives is important to the success of mobile library services. Second, the model allows for testing the effects of various factors, such as perceived interactivity and satisfaction, on usage of mobile library apps. Third, many previous research studies associated with adoption of the TAM have been conducted and included in library environments (Thong et al., 2002; Park, Roman, Lee, & Chung, 2009; Miller & Khera, 2010; Xu, Gan, & Yan, 2010; Booker, Detlor, & Serenko, 2012; Joo & Choi, 2015; Sheikhshoaei & Oloumi, 2011; Aharony & Prebor, 2015). Therefore, it is necessary to conduct research that deals more intensively with undergraduate students' intentions to use mobile library apps.

This paper asks two questions to investigate the causal relationships with the proposed library app model: First, what kinds of factors affect

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user attitude and intention to use mobile library apps in academic libraries? Second, can the TAM be applied to user acceptance of mobile library apps in academic libraries?

The purpose of this research is to investigate the primary roles of perceived usefulness, interactivity, and ease of use in user attitudes and intentions to use mobile library apps. Additionally, with the improvement of mobile library services, the current study employs user satisfaction factors as antecedents of intentions to use mobile library apps. The present study's findings are valuable for both academic library researchers and library practitioners, as the model's causal relationships are analyzed.

The results of this research can provide a foundation for the improvement of mobile library services in academic libraries. They can establish guidelines for the evaluation of mobile library apps in library environments, which significantly affect potential users' acceptance of newly introduced services. In conclusion, academic libraries that are willing to build mobile library apps can provide mobile services that are more useful, interactive, easy, and satisfactory for library users.

LITERATURE REVIEW

A variety of models drawn from various disciplines, such as psychology, sociology, and management, have been employed to explain people's intention to adopt new technology. TAM has been widely used to identify the determinants of technology acceptance in many contexts, and especially for predicting people's acceptance of information technology (Davis, 1989). TAM has been continuously studied and has expanded two major theories, TAM2 (Venkatesh & Davis, 2000) and UTAUT (unified theory of acceptance and use of technology) (Venkatesh, Morris, Davis, & Davis, 2003). TAM is built on the theory of reasoned action (TRA), which suggests that an individual's behavior is initiated by his or her behavioral intention, which is determined by one's attitude and subjective norms regarding the behavior in question (Fishbein & Ajzen, 1975). According to the TRA, the intention to act directly determines behavior because people generally behave as they intend to. TAM was initially proposed by Davis (1993), and is based on two beliefs that affect attitude and behavioral intentions: perceived usefulness and perceived ease of use.

Previous research in adopting TAM primarily investigated personal behavior to use new information systems and technology in library environments. TAM is used as a tool in the digital library field to determine how users' behavior affects their acceptance of digital libraries (Thong et al., 2002; Park et al., 2009; Miller & Khera, 2010; Xu et al., 2010). Thong et al. (2002) identified three system interface characteristics, three organizational context variables, and three individual differences as critical external variables that have an impact on adoption intention through a digital library's perceived usefulness and perceived ease of use. Further, they also found that both perceived usefulness and perceived ease of use are determinants of user acceptance of digital libraries.

Park et al. (2009) examined the factors that influence people's adoption and use of a digital library system in the context of developing countries. They found that the library system's perceived ease of use had a significant impact on perceived usefulness, which ultimately led to behavioral intention to use. Additionally, the study identified the similarities and differences in significant predictors of the digital library's acceptance across countries and continents.

Miller and Khera (2010) posited some of the features that relay user acceptance of a digital library system implementation at agricultural universities in two developing countries: Kenya and Peru. They found that the TAM worked well in describing factors that affect the usage of digital libraries in developing countries, with perceived usefulness as the primary predictor of intent in using this system.

Xu et al. (2010) built a structural model combining perceived usefulness, perceived ease of use, user satisfaction, and intention to use in digital library based on user cognition and TAM. Further, they added four dimensions: external environments, such as online environments and retrieval requirements; individual, such as retrieval and computer capabilities; system, such as system content and system function qualities; and a servicing factor.

Research adopting TAM can also be found in studies of online library resources (Booker et al., 2012; Joo & Choi, 2015). Booker et al. (2012) explained how information literacy instruction influences business students' adoption of online library resources. The research model consisted of six constructs: amount of information literacy instruction, online library resource anxiety, online library resource self-efficacy, perceived usefulness, perceived ease of use, and the intention to use online library resources. They found that self-efficacy and anxiety were important antecedents to online library resource adoption.

Joo and Choi (2015) explored multiple factors affecting undergraduate students' online resource selection. The study found that both usefulness and ease of use positively influenced the undergraduates' intention to use online library resources. Five resource quality constructs—accessibility, credibility, coverage, currency, and format—were also found to be determinants of online library resources' use intention.

Additionally, two studies have adopted the TAM (Sheikhshoaei & Oloumi, 2011; Aharony & Prebor, 2015). Sheikhshoaei and Oloumi (2011) studied determinant factors in the acceptance of information technology (IT) by librarians in Iranian engineering faculty libraries. They that found all independent variables (perceived usefulness, perceived ease of use, attitude to use, and behavioral intention to use) in the TAM framework affect the acceptance of IT. Aharony and Prebor (2015) examined librarians' and information professionals' perspectives toward discovery tools, and confirmed that the TAM, cognitive appraisals, openness to experience, and importance of discovery tool features affect respondents' satisfaction with discovery tools.

UTAUT has also been applied in library settings. As an extension of the TAM, the UTAUT was proposed by Venkatesh et al. (2003), and this model identifies a range of factors such as, performance expectancy, effort expectancy, social influence, and facilitation conditions, which impact both behavioral intention and use behavior. Chang (2013) examined the integration of UTAUT with task technology fit to explain behavioral intention of users toward library mobile apps in university libraries. He found that performance expectancy, effort expectancy, social influence, and facilitation conditions determine behavioral intention toward library mobile apps. The moderating effect of task-technology fit is also significant as a determinant in the UTAUT model.

Saravani and Haddow (2011) investigated the current state of staff preparedness at libraries across Australia and New Zealand, regarding delivering services through mobile technologies. A modified version of the UTAUT was tested as a predictor of behavioral intention and use behavior. This analysis revealed a range of themes relating to technical functionality, management, service delivery, and adaptability as important to staff skills and knowledge.

As discussed in the literature review, researchers have contributed greatly to investigations of the multiple factors affecting user behaviors based on the TAM in library environments. Prior studies showed that perceived usefulness, perceived ease of use, and user satisfaction are important determinants of user acceptance of digital libraries. Despite all these efforts, there is an inadequacy of research specifically focused on the use of mobile library apps by undergraduates in academic libraries. This limitation illustrates the need for research regarding user acceptance of mobile library apps based on the TAM in academic libraries.

RESEARCH HYPOTHESES

Based on the theoretical components of the TAM, this study proposed the following hypotheses with regard to the use of mobile library apps. Fig. 1 graphically summarizes the research hypotheses.