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Factors influencing users' satisfaction and loyalty to digital libraries in Chinese universities

Fang Xu ^a, Jia Tina Du ^{b,*}^a School of Social Science, Soochow University, Suzhou, Jiangsu, 215123, China^b School of Information Technology and Mathematical Sciences, University of South Australia, GPO BOX 2471, Adelaide, SA, 5001, Australia

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ABSTRACT

Users' loyalty to digital libraries is declining. There are quite a few studies on user satisfaction in digital libraries. However, the affinity theory and the loyalty theory are rarely applied to study digital library use. The purpose of this study is to integrate the information system success theory, Technology Acceptance Model, and affinity theory to identify the factors that may affect user satisfaction and user loyalty to digital libraries. A total of 426 valid survey questionnaires were collected. The structural equation modeling was employed to test the proposed research model and hypotheses. The results indicated that, instead of information quality, system and service quality significantly affected perceived ease of use, perceived usefulness and digital libraries (DLs)' affinity. Both perceived ease of use and DLs' affinity impacted on perceived usefulness. Moreover, perceived usefulness and DLs' affinity had significant effects on user satisfaction, thereby affecting user loyalty. We also found that user differences, including age, gender, and educational level, significantly affected DLs' affinity, which further influenced user satisfaction and loyalty. Implications for librarians and service providers to improve the quality of digital libraries are provided.

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1. Introduction

With the rapid development of cloud computing, cloud storage and other information technologies, digital libraries are increasingly enabling users to remotely access a wide range of distributed information resources without considering the physical storage condition (Cherukodan, Kumar, & Kabir, 2013). Digital libraries can be considered as an effective way to organize information resources and deliver related services to users. After over two decades of development, both theories and practices of digital libraries have been developed rapidly and globally (Heradio, Fernandez-Amoros, Cabrerizo, & Herrera-Viezma, 2012).

Along with the rapid development of the Internet technology and digital libraries, users' information needs and behaviors have transformed a lot, including emphasizing the convenience and expedience of access to information resources and expecting to interact with information providers. Consequently, the functions of digital libraries have changed dramatically and a digital library is no

longer just a collection of information resources but should be a digital community for users' communication, e-learning and e-research (Hu, Hu, & Yan, 2014). At the same time, digital libraries are facing tough competitions nowadays as an information provider (Ross & Sennye, 2008) and greater attentions should be paid to the quality evaluation (Heradio et al., 2012). Research shows that digital libraries are bypassed by their potential users (Ross & Sennye, 2008) who are preferring search engines to digital libraries to acquire online information and meet their information needs (Kiran & Diljit, 2011). Therefore, if a user no longer thinks that digital library is their digital information center, their loyalty to digital libraries would be reduced. It is the time for digital libraries to start worrying about user loyalty (Keshvari, Farashbandi, & Gerai, 2015).

Previous studies have investigated some factors on user satisfaction and user loyalty to digital libraries using the information technology adoption theories such as Technology Acceptance Method (TAM) (Joo, Park, & Shin, 2017; Yoon, 2016), the information system success theory (Chang, 2013), social influence (Fusilier & Durlabhji, 2005), self-efficacy (Shell, Soh, & Chiriacescu, 2014), perceived interactivity (Yoon, 2016), and affinity (Ruiz-Mafé & Sanz-Blas, 2006; Zha, Xiao, & Zhang, 2014). Prior research has

* Corresponding author.

E-mail addresses: nankaixufang@aliyun.com (F. Xu), tina.du@unisa.edu.au (J.T. Du).

shown that information system success theory can well explain the quality of digital libraries; TAM and affinity theory are able to reveal users' perception of the quality of digital libraries. However, limited research has used the affinity theory to mediate the effects of digital libraries' quality on user satisfaction. The concept of loyalty has also been rarely applied to the study of digital libraries (Bakti & Sumaedi, 2013; Kiran & Diljit, 2011). Researchers have found that the factors such as user satisfaction (Townley & Boberg, 1997), quality of services (Malik, 2012), and customer value (McKnight, 2010) influenced customer loyalty directly or indirectly. However, the inherent relationship between these constructs remained to be further studied and more constructs to influence user loyalty should be considered. Therefore, the current study presents a comprehensive investigation of multiple factors that may affect user satisfaction and user loyalty to digital libraries by addressing the following research questions:

RQ1. What are factors affecting user satisfaction and user loyalty of digital libraries from the perspectives of information system success theory, TAM, and affinity theory?

RQ2. What are the relationships among these factors?

To answer these questions, we propose that system quality, information quality, and service quality affect perceived ease of use, perceived usefulness and DLs' affinity, further affecting user satisfaction and user loyalty to digital libraries.

The remainder of this paper is organized as follows. In section 2, the related works are reviewed and the conceptual model guiding this study is presented. In the subsequent sections, the instrument development and data collection are reported, followed by the data analysis and results. The paper concludes with the implications and future work.

2. Literature review and research hypotheses

2.1. Information system success theory

Information system success theory was proposed by DeLone and McLean (1992) to explore how system quality and information quality influenced users' information system use and satisfaction. In 2003, the authors revised the model by incorporating service quality and they argued on how system, information and service quality affected usage and satisfaction (DeLone & McLean, 2003).

The theory of information system success has been widely applied and empirically validated in various contexts. For example, a study by Wixom and Todd (2005) found that user satisfaction, perceived usefulness, ease of use and usage behavior of data warehousing software were affected by information and system quality. More recently, Shin and Shim (2017) examined the relationship between human experience and quality perception of multiplatform television (MT) services and they proposed a conceptual model for quality of experience (QoE) in MT. A study by Shin and Biocca (2017) found that multi-screen services' usability was affected by multi-screen quality, which influenced users' adoption of the technology. In addition, research by Zhang (2010) suggested that system and information quality were main determinants on social networking users' satisfaction and sense of community.

In recent years, researchers have started to apply the information system success theory to the study of digital libraries. For instance, Chang (2013) noted that system, information and service quality significantly influenced perceived value and user satisfaction on e-learning system in academic libraries. Similarly, Zha et al. (2014) used this theory to explain the relationship between digital libraries' quality and users' affinity with digital libraries. Existing

research has greatly contributed to the application of information system success theory in digital libraries and identified the effects of system, information and service quality. Adopting Gefen's (2002) definitions, in the current study, system quality refers to the stability, navigation, effectiveness and layout of digital libraries. Information quality reflects the timeliness, accuracy and comprehensiveness of information provided by digital libraries. Service quality means the dependability, responsiveness, assurance and empathy of the services delivered by digital libraries.

2.2. TAM

Based on the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Davis (1989) proposed the TAM to explain the acceptance and use of information technology. The TAM showed that perceived usefulness and perceived ease of use were two main determinants on user acceptance of an information technology. The TAM is considered as an influential model to explain information technology acceptance (O'Cass & Fenech, 2003). For example, Kim, Mirusmonov, and Lee (2010) argued that individual differences and mobile payment features influenced users' adoption of mobile payment system through perceived usefulness and ease of use. In addition, TAM has been used to predict the acceptance and use of information technology such as e-mail and World Wide Web (Gefen & Straub, 1997), e-commerce (Zhou, 2011), online games (Hsu, Lu, & Hsu, 2007), and e-learning (Lee, 2005). In a recent study, Shin (2017) examined the relationship between consumer experiences and the quality perception of the Internet of Things (IoT). The author developed a conceptual model for quality of experience (QoE) in personal informatics which was based on TRA and the theory of planned behavior (TPB).

In the current study, we extended TAM to the field of digital libraries. Our working definition of perceived usefulness reflects the degree to which a user believes that using a digital library would improve his or her work performance and efficiency. Perceived ease of use refers to the degree to which a user thinks that using a digital library will be a thing that does not require much time and effort. Matusiak (2012) identified that usefulness was one of the main factors that affected usage of digital library resources. Similarly, Thong, Hong, and Tam (2002) noted that both usefulness and ease of use significantly impacted on user acceptance of digital libraries. Jeong (2011) found that both perceived usefulness and ease of use were main determinants on user satisfaction on electronic library systems. Recently, Joo and Choi (2015) argued that undergraduates' continuance intention to use online library resources was significantly affected by perceived usefulness and ease of use. Moreover, Asad and Saima (2016) suggested that system quality had the highest direct effect on usefulness and the navigation greatly affected easy use of the higher education commission digital library in Pakistan.

Prior work has helped us to understand the effects of perceived usefulness and perceived ease of use on users' acceptance of information technology. However, there is a lack of emphasis on the influential factors that may affect perceived usefulness and ease of use in digital libraries. From what has been discussed above, we know that system, information, and service quality may impact on users' perceptions towards digital libraries. Furthermore, these factors would affect users' evaluations on the difficulty and utility of digital libraries. For instance, if a user believes a digital library has problems of interruption, inefficient navigation and unclear layout, he or she will perceive that the digital library is difficult to use. Similarly, if a digital library is outdated, inaccurate or has limited information, users will consider that the digital library is in low utility. Moreover, if the service quality of digital library is low, users may need to make greater efforts to use it. Thus, we assume

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