Computer Standards & Interfaces 35 (2013) 195–204

Contents lists available at SciVerse ScienceDirect

Computer Standards & Interfaces

journal homepage: www.elsevier.com/locate/csi

Determining the relative importance of mobile banking quality factors

Hsiu-Fen Lin *

Department of Shipping and Transportation Management, National Taiwan Ocean University, No. 2, Beining Road, Keelung 202-24, Taiwan, ROC

ARTICLE INFO

Article history:
Received 7 May 2012
Received in revised form 1 July 2012
Accepted 26 July 2012
Available online 10 September 2012

Keywords:
Mobile banking
Quality evaluation
Fuzzy analytic hierarchy process
Extent analysis approach

ABSTRACT

The aim of this study is to use fuzzy analytic hierarchy process (AHP) with an extent analysis approach to develop a fuzzy evaluation model which prioritized the relative weights of m-banking quality factors between low- and high-experience groups. The research findings indicated that there are some similarities and differences between high- and low-experience groups with regard to the evaluation of m-banking quality. With respect to the final weights for the criteria level, both groups considered "customer service" to be the important factor affecting m-banking effectiveness. The research findings also provide insightful information to m-banking service providers so that they may improve the effectiveness and efficiency of m-banking.

1. Introduction

Mobile banking (m-banking) (Internet banking using mobile devices, also known as m-banking, mbanking, SMS banking, etc.) can perform account balances and transaction history inquiries, funds transfers, and bill payments via mobile devices such as cell phones, smartphones, and PDAs (personal digital assistants) [24,49]. M-banking may have new features (such as ubiquity, flexibility and mobility) compared to conventional banking channels (e.g., automated teller machine, phone-banking, non-mobile Internet banking). For customers, m-banking provides a very convenient and effective means of managing personal finances, supporting seamless anytime, anywhere connectivity [40]. Since m-banking services are relatively new electronic delivery channels to be offered by banks, assessing their quality or effectiveness is critical for both m-banking researchers and service providers (including banks, telcos and other financial institutions). Chung and Kwon [13] and Lin [30] also argued that customer experience with m-banking services influence their intentions to use such services. To our best knowledge, no study has been undertaken to evaluate the relative importance of m-banking quality factors between two groups of customers — one group with low m-banking experience and the other with high m-banking experience.

Information system (IS) researchers have proposed that m-banking can be considered as one of the most significant service innovations, which is emerging as a key platform for expanding access to banking transactions via mobile devices [25,47]. Thus, providing a professional and high quality service is increasingly recognized a critical factor for successful implementation of m-banking. Previous studies on m-banking quality have generally focused either on specific sets of technical functions or basic content management [26,56]. Regarding technical functions, there are evaluations of ease of use [29,31], transaction speed [16], and system security [53]. In analyzing mobile content delivery, some researchers have evaluated the up-to-date, accurate and relevant information [32,48]. Stair and Reynolds [45] also identified that determinants of m-banking quality or effectiveness are related to convenience, service accessibility without constraints of time and place, privacy and savings in time and effort. The literature has mentioned a broad range of factors that influence m-banking quality. The evaluation of m-banking quality is potentially very complex due to the multitude of variables that influence the decision process [55].

Determining the most important influences on m-banking quality is crucial and helps service providers focus on factors with the highest weight and identify the best policy to improve m-banking effectiveness. That is, how to evaluate the relative importance of these factors thus can be considered as a multiple-attribute decision-making problem. Analytic hierarchy process (AHP) is an appropriate method for solving multiple-attribute decision-making problems [41]. However, the decision maker can specify preferences in the form of natural language expressions about the importance of each evaluation item [17]. This implies that human judgment on the importance of alternatives or criteria is always subjective and imprecise. To make up for this deficiency in AHP, several researchers integrate fuzzy logic theory with AHP to determine the criteria weights from subjective judgments of decision makers [5,15,30,39]. Consequently, this study attempts to apply the fuzzy AHP approach to determine the relative weights of m-banking quality factors between low and high-experience groups.

* Department of Shipping and Transportation, Management, National Taiwan Ocean University, No.2, Beining Road, Keelung 202-24, Taiwan. Tel.: +886 2 24622192x3409; fax: +886 2 24631903.
E-mail address: hflin@mail.ntou.edu.tw.

0920-5489/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.csi.2012.07.003

As a conclusion of the above statements, this study has two sub-objectives. The first is to evaluate the relative importance of m-banking quality factors. Based on reviewing and analyzing literature on m-banking quality factors, this study identifies evaluated criteria which influence the m-banking quality. Then this study integrates fuzzy AHP with an extent analysis approach to develop a fuzzy evaluation model which prioritized the relative weights of m-banking quality factors. By examining this gap, this study contributes to providing some design guidelines and strategies for firms involved in m-banking.

2. Literature review

2.1. Mobile banking

M-banking is a subset of mobile commerce applications which enables customers to conduct conventional (e.g., balance checks and fund transfers) and more advanced (e.g., stock trading and portfolio management services) banking transactions through mobile devices [23,24,49]. M-banking adoption differs from electronic banking (or non-mobile Internet banking) adoption in at least two ways. First, electronic banking is Internet-based customer access to banking services, while m-banking is mobile phone based customer access to banking services. As electronic banking edges further into the mainstream of banking services, financial institutions are leading the way into the new technological frontier: mobile access [35]. M-banking has become increasingly ubiquitous and thereby changes the business of retail banks significantly in terms of cost reduction and increased convenience for the customer [33]. Second, the difference between mobile and electronic banking is the pace of evolution, with mobile banking evolving much faster than electronic banking [24]. M-banking services provide customer value creation due to being inherently time and place independent, as well as their effort-saving qualities [35]. Consequently, m-banking has become the self-service delivery channel that allows banks to provide information and offer services to their customers with more convenience via mobile devices.

2.2. Quality factors in the m-banking context

According to DeLone and McLean's [14] IS success model, quality factors may be the important antecedents of IS success. Previous researchers have explored the quality factors associated with various mobile commerce applications. Mahatanankoon et al. [34] suggested that in order to reach mobile commerce benefits, operation modes and strategies must provide good service quality through value-added, location-centric, and customized mobile applications. Chen [10] conducted a study on mobile payment and found quality factors (e.g., perceived transaction convenience, perceived transaction speed, security concerns, and privacy concerns) as important antecedents of customer acceptance of mobile payment. Choi et al. [12] found that transaction process and content reliability significantly influence customer satisfaction and loyalty in mobile commerce. In the study of Yeh and Li [54], they showed a close link between web site quality (i.e. interactivity and customization) and customer satisfaction towards the vendors on the mobile internet. Lu et al. [32] proposed and examined a multidimensional and hierarchical model of mobile service quality in the context of mobile brokerage services. Their measure of mobile service quality has three dimensions including interaction quality which is influenced by attitude, expertise, problem solving, and information, environment quality which is affected by equipment, design, and situation, and outcome quality which is determined by punctuality, tangibles, and valence. In the context of mobile information and entertainment services, Tan and Chou [48] proposed seven mobile service quality including perceived usefulness, perceived ease of use, content, variety, feedback, experimentation, and personalization.

The concept of m-banking quality can be defined as overall customer evaluations and judgments regarding the excellence and quality of mobile content delivery in the context of m-banking [14,28,44]. Several studies examined m-banking quality factors by studying the antecedents of customer satisfaction and behavioral intention to use m-banking. For example, Gu et al. [16] adapted the technology acceptance model (TAM) to study the determinants of customer intentions to use m-banking. In their research model, system quality was measured through perceived network speed and system stability of m-banking services. Lee and Chung [26] considered three quality factors (including system quality, information quality, and interface design quality) in which m-banking was provided and adapted from the updated DeLone and McLean IS model [14], to fit characteristics of m-banking services. Yu and Fang [55] also identified six dimensions to measure post-adoption customer perceptions of m-banking services including security service, interactivity, relative advantage, ease of use, interface creativity, and customer service, which were confirmed by exploratory and confirmatory factor analysis. Luo et al. [33] showed that both trust belief and risk belief significantly drive customer's intention to adopt m-banking. Zhou [57] used elaboration likelihood model (ELM) as the theoretical based to examine the effect of central cues (information quality and service quality) and peripheral cues (system quality, reputation, and structural assurance) on m-banking user behavior.

These quite different perspectives regarding m-banking quality factors can roughly be termed content-based feature such as information quality versus functionally-based feature such as interface design and customer service. The existence of different influences on m-banking quality can provide a basis for assessing the relative importance of m-banking quality factors. Table 1 summarizes such factors discussed in the recent mobile commerce and m-banking literature.

3. Fuzzy analytic hierarchy process

3.1. Essences of fuzzy analytic hierarchy process

Analytic hierarchy process (AHP) is a useful method for solving complex decision-making problems involving subjective judgment [43]. In AHP, the multi-attribute weight measurement is calculated via pairwise comparison of the relative importance of two factors. Though AHP is designed to capture decision-maker knowledge, the conventional AHP does not fully reflect human thinking style [4]. However, it is well recognized that human perceptions and judgments are represented by linguistic and imprecise patterns for a complex problem. Linguistic and imprecise descriptions were difficult to solve using AHP until the recent development in fuzzy decision-making [3,11]. Fuzzy set theory resembles human reasoning in its use of approximate information and uncertainty in decision generation. A major contribution of fuzzy set theory is its capability to represent vagueness. Meanwhile, AHP was developed to solve the multiple-attribute decision-making problem. By incorporating fuzzy set theory with AHP, fuzzy AHP enables a more accurate description of the multiple-attribute decision-making process [2]. The earliest work in fuzzy AHP appeared in van Laarhoven and Pedrycz [50], compared fuzzy ratios described with triangular membership functions. Many studies using fuzzy AHP are proposed to calculate the importance (weights) of evaluation items [5,15,30,39]. Therefore, in this study, the author prefers the fuzzy AHP approach since this approach is adequate to explicitly capture the importance assessment for human imprecise judgments.

Since mobile communication technologies and wireless transaction environments involve intangibility and uncertainty, evaluating m-banking quality becomes more difficult for customers. Most decision makers tend to assess performance based on their own