

# Assessing the Effects of Mobile Service Quality on Customer Satisfaction and the Continued Usage Intention of Mobile Service: A Study of Non-gaming Mobile Apps

Wei-Tsong Wang<sup>1(✉)</sup> and Wen-Yin Chen<sup>2</sup>

<sup>1</sup> Department of Industrial and Information Management, National Cheng Kung University, Tainan, Taiwan

wtwang@mail.ncku.edu.tw

<sup>2</sup> Institute of Information Management, National Cheng Kung University, Tainan, Taiwan  
wenying30@gmail.com

**Abstract.** Research indicates that one of the key drivers of the development of m-commerce is the provision of various types of high-quality mobile applications/services (apps). Business managers have thus been devoting themselves into not only attracting new customers but also retaining existing customers. Despite the considerable amount of studies on mobile apps, there are few studies that specifically investigate the effects of mobile-service-related quality factors on m-commerce consumers' continuance intention regarding specific mobile apps. This study thus develops a research model that describe the relationships among mobile-service-quality factors (interaction quality, environment quality, and outcome quality), customer satisfaction, and the mobile-apps users' continuance intention. The proposed research model was empirically validated using data collected from the users of mobile apps in Taiwan. The research results indicate that the three quality factors were key determinants of customer satisfaction and continuance intention. Theoretical and practical implications are subsequently discussed.

**Keywords:** Mobile apps · Mobile service quality · Customer satisfaction · Continuance intention

## 1 Introduction

Because of the increasing popularity of mobile devices, including smart phones and tablets, the market potential of mobile commerce (m-commerce) has been growing all over the world. The emergence of the m-commerce era and the prosperous development of mobile technologies enable the mobile devices to serve as not only communication devices but also multi-functional personal digital assistants in people's daily lives. Research indicates that one of the key drivers of the development of m-commerce is the provision of various types of high-quality mobile applications/services (mobile apps).

Compared to the conventional electronic commerce (e-commerce) services, mobile apps has the unique characteristics, including location-awareness, conditions of usage, adaptivity, ubiquity, personalization, and broadcasting, which allow customers to use mobile applications/services anytime and anywhere. Because the current mobile application/service market is highly competitive, business managers have thus been devoting themselves into not only attracting new customers but also retaining existing customers. Additionally, research indicates that the unit cost of acquiring a new customer is much higher than that of retaining an existing customer, enhancing customers' continuance intention is critical to mobile application providers in terms of cost saving and business expansion. Consequently, there have been many studies that investigate critical factors influencing the intention of the users of mobile apps to continue to use those applications in order to provide managers of corporations with guidelines regarding the establishment of favorable long-term relationships with their customers in order to acquire sustainable competitive advantages.

Although a considerable amount of the mobile apps are provided to m-commerce consumers for free, those consumers tend to consider carefully regarding the use of a specific mobile application/service in terms of whether the use of a particular mobile app would satisfy their specific needs the most before downloading them because of the concern regarding the relatively limited storage space and operating capabilities of their mobile devices. Therefore, good service quality of mobile apps can enhance customers' satisfaction regarding their use experience of those mobile apps, which, in turn, decrease customers' intentions to switch to competing mobile apps. However, there are few studies that specifically investigate the effects of mobile-service-related quality factors on m-commerce consumers' continuance intention regarding specific mobile apps. It is thus difficult for us to identify the key success factors that significantly influence the variation of customer loyalty to a specific mobile app. Consequently, how to strengthen m-commerce users' intention to continue to use specific mobile apps via improving mobile service quality is considered to be an important issue that deserves extra research efforts.

Based on the discussion of our research background and motivations represented above, the purpose of this study is to investigate the relationships among mobile services quality, customer satisfaction, and customers' continuance intention from the viewpoint of mobile service quality. This study thus proposes a research model that depicts how the three mobile-service-related quality constructs, including interaction quality, environment quality, and outcome quality, affect customer satisfaction and customers' continuance intention regarding a specific mobile app.

## **2 Literature Review**

In this section, we introduce the development of mobile services and mobile applications. Then, we discuss service quality from the perspective of m-commerce to find out the key quality factors that may affect customer satisfaction and continuance intention of mobile apps' users. Finally, a research model is proposed to investigate the effects of the key quality factors on the customer satisfaction and continuance intention.

## 2.1 Mobile Applications/Services

Because of the exceptional development of mobile devices, the major form of mobile services is mobile apps in the current mobile commerce market. Taylor et al. [1] define mobile apps as small programs that run on mobile devices and perform missions such as internet banking, gaming, or web page browsing. In 2012, 54.9 % of cell phone users in the U.S. use smartphones as a result of the popularity of mobile apps. Nielsen reports that from 2011 to the second quarter of 2012, the average number of apps installed on a smartphone has increased from 32 to 41.

However, because the number of mobile apps in the market is increasing rapidly, mobile service providers are encountering fierce competition in the marketplace. Consequently, it is critical for mobile service providers to find out the critical success factors of enhancing customers' continuance intention. Many studies have been focusing on this issue and most of them highlight the importance of the construct of service quality in the information systems success model proposed by DeLone and McLean [2] in understanding the success of mobile apps. Although many academics consider m-commerce as an extension of e-commerce, m-commerce services are quite different from traditional e-commerce services because of their unique service attributes and industry features. Consequently, the evaluation of service quality of mobile services should be based on the service quality evaluation models that take into considerations of the unique features of m-commerce.

## 2.2 Mobile Service Quality

Previous research of customer satisfaction has indicated that service quality is an important evaluation index [3]. Service quality plays a key role in helping different industries evaluate if they clearly understand customers' needs in traditional business environment. At the era of Internet, service still plays an influential role in electronic commerce and mobile commerce [4, 5]. However, many corporations simply use web sites and mobile services as new tools of posting static company information on the Internet, but do not appropriately take advantage of web sites and mobile services for boosting companies' businesses. When users rely more and more heavily on various web-based applications in their daily lives, how to provide them with better services to attract customers and how to evaluate the service quality of mobile services have become a major concern to corporations.

The arrival of mobile commerce era motivates mobile service providers to develop methods that help them appropriately evaluate the perceived mobile service quality of customers in order to achieve higher customer satisfaction and to increase the value of services in the extremely competitive environment of mobile services [6–8]. A review of the literature regarding the evaluation of the mobile service quality reveals that most of the existing studies focus on the viewpoint of customer satisfaction. For example, Kim et al. [6] use summarize the findings of prior literature [9–11] to develop a theoretical framework to define the six dimensions of mobile service quality, including call quality, value-added services, customer support, loss cost, move-in cost, and interpersonal relationship. Brady and Cronin [3] also propose a framework that incorporates

three primary dimensions of mobile service quality (interaction quality, physical environment quality and outcome quality). However, the dimensions of service quality proposed by Brady and Cronin [3] are limited to the measurement of service quality in traditional service contexts. The sub-dimensions, for example, ambient condition/social factors, are not applicable in measuring the service quality of virtual services. Therefore, Lu et al. [8] refine Brady and Cronin's [3] framework and propose a model of mobile service quality. Their model consists of three primary dimensions: interaction quality, environment quality, and outcome quality. Thus, this study chooses mobile applications as the main research subject from various mobile services and adopts Lu et al.'s [8] mobile service quality model for our investigations. This framework of mobile service quality includes three primary dimensions. First, interaction quality refers to quality of a customer's interaction with the mobile service provider during the service delivery. Additionally, environment quality refers to quality evaluation of customers toward utility equipment, interface design, and the appropriateness of provided contents. Finally, outcome quality refers to the service experience that customers perceive during the service delivery process and what customers are left with when the service procedure is finished.

### 3 Research Model and Research Hypotheses

Based on the results of our literature review, a theoretical model to assess the consumers' satisfaction and continuance intention with regard to mobile applications is developed, as presented in Fig. 1. In the remaining part of this section, the development of our research hypotheses will be discussed in details.

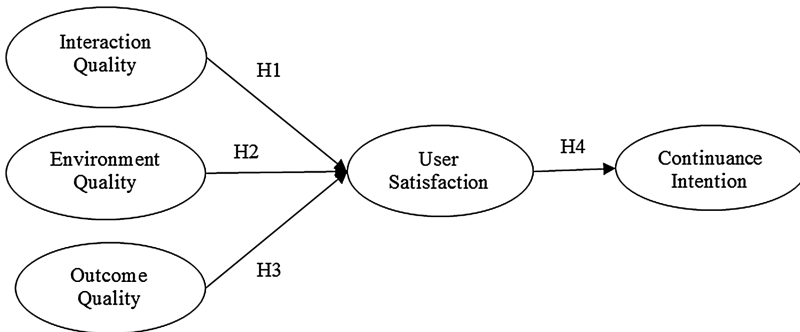


Fig. 1. The research model

The effects of service quality on user satisfaction have been discussed in many studies [2, 3, 12, 13]. A lot of investigations have also been made in the existing marketing literature of mobile business [8, 14, 15].

Chae et al. [16] argue that connection quality, content quality, interaction quality, and contextual quality will affect user satisfaction. Connection quality and content quality refer to the stability and the usefulness of the information of mobile services,

which are believed to affect user satisfaction. In this study, these two qualities are classified into environment quality. Interaction quality refers to the interactive relationship with service providers, including the most used positioning and navigation functions. Finally, contextual quality belongs to one of the sub-dimensions of the outcome quality. To mobile application customers, the user satisfaction would be enhanced when service providers provide the required services at the right time. Chiou and Droge [17] also indicate that interactive service quality plays a key role in forming user satisfaction, because it affects how customers perceive the service quality. Kuo et al. [18] point out that factors including interface design, system reliability, connection stability (i.e., environment quality) can significantly influence the user satisfaction of mobile services. Finally, Dabholkar and Overby [19] investigate real estate agents and find out that outcome quality is closely connected to customer satisfaction. However, Zhao et al. [15] indicate that even though that the service quality is high, the negative WOM of outcome quality for services or commodities will create unpleasant shopping experiences to customers and the degree of customer satisfaction would be low. Based on the discussion above, the following hypotheses are developed.

**H1:** Interaction quality positively influences user satisfaction regarding a mobile application.

**H2:** Environment quality positively influences user satisfaction regarding a mobile application.

**H3:** Outcome quality positively influences user satisfaction regarding a mobile application.

From the viewpoint of mobile service providers, the purpose for providing satisfied services is to attract customers to continually use their mobile services, and thus to increase customers' adhesion of services for acquiring more commercial benefits. In the e-commerce field, Bhattacharjee [20] points out that satisfaction is a key predictor of users' continuance use intention. Additionally, Riel et al. [21] find out that satisfaction positively influenced customers' continuance use intention of portal sites. The above literature have proved that customers' satisfaction with products or services will directly or indirectly affect their willingness to repurchase or reuse [22–24]. In summary, user satisfaction and continuance use intention usually have a positive relationship. Therefore, the following hypothesis is proposed.

**H4:** User satisfaction positively influences users' continuance intention regarding a mobile application.

## 4 Data Collection and Analysis

### 4.1 Instrument Development

To develop an effective survey, 47 items relevant to the five constructs of the research model were adapted from the existing literature and refined based on the specific topic

of this study. All of the survey items were pilot-tested with 34 individuals who had experience in using mobile applications on a daily basis. The internal consistency and reliability were examined using Cronbach's alpha coefficient analysis. The questionnaire was further refined based on the results and feedback from the pilot test. The final questionnaire consisted of 42 items. Items included in the final revised questionnaire were considered highly reliable because the individual Cronbach's alpha coefficients of all the first-order constructs reached the recommended level of 0.7 (ranging from 0.77 to 0.90). The items in the survey were measured using a seven-point Likert scale ranging from (1) strongly disagree to (7) strongly agree.

## 4.2 Data Collection and Analysis

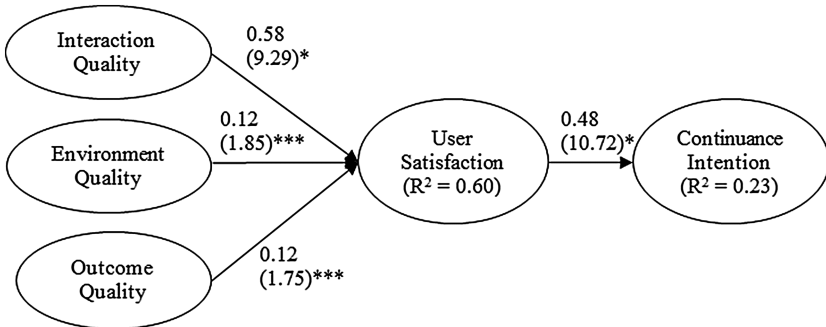
The data for this study were collected using an online questionnaire to survey consumers who had experience in using mobile applications on a daily basis in Taiwan. The most popular online bulletin board system (i.e., the PTT) were selected as the survey distribution channels. Of the 367 questionnaires received, 72 incomplete or problematic responses were later removed, yielding 295 valid responses and a rate of useful response of 80.4 %.

The technique of the component-based structural equation modeling (SEM), namely the partial least squares (PLS), was adopted for the data analysis procedure of this study. The reliability of the measures for each of the five latent constructs was first tested by examining the individual Cronbach's alpha coefficients. For the five constructs investigated, all of these were greater than the recommended level of 0.7 or higher (ranging from 0.70 to 0.90). Then, using the SPSS and SmartPLS 2.0 software packages, the psychometric properties (i.e., construct validity) of the measurement model were assessed in terms of convergent and discriminant validity [25, 26].

Three primary measures were used to evaluate the convergent validity of the measurement model: (a) the factor loadings of the indicators, which must be statistically significant with values greater than 0.6; (b) composite reliability (CR), with values greater than 0.6; and (c) average variance extracted (AVE) estimates, with values greater than 0.5. The results of our analysis indicate that all factor loadings (ranging from 0.67 to 0.93) of the measures used were statistically significant, and all were larger than the restrictive criterion of 0.6. Additionally, all CR values (ranging from 0.82 to 0.92) were higher than 0.6, indicating a reliable measurement model. Finally, the AVE values ranged from 0.60 to 0.65, indicating that each construct was strongly related to its respective indicators. Overall, the measurement model exhibited adequate convergent validity. Finally, the discriminant validity of the measurement model was determined to be satisfactory, since the squared correlations between constructs were smaller than the corresponding AVE estimates [25]. To conclude, the measurement model was adequate.

By adopting the PLS technique using the bootstrapping procedure, the structural model was evaluated for hypotheses testing. Bootstrapping of the 295 cases (the same as the original sample size) was conducted with 1000 samples to evaluate the significance of the proposed research hypotheses. Figure 2 presents the standardized path coefficients and t values, the significance of the paths, and the coefficients of

determination ( $R^2$ ) for each endogenous construct. As shown in Fig. 2, all the hypotheses were supported by the data.



Note 1: Standardized path coefficients are reported (t value in parentheses)  
 Note 2: \*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.1$ .

Fig. 2. The hypothesis testing results

## 5 Discussion and Conclusion

This study has developed and validated a research model for explaining the satisfaction and continuance intentions of mobile application/service users by adopting the perspective of mobile service quality. Interaction quality, environment quality, and outcome quality were all found to be significant factors in determining user satisfaction and continuance intentions regarding mobile applications/services. The research findings can thus provide mobile service providers with significant insights into how factors of mobile service quality may impact the continuous adoption of mobile applications/services. Additionally, the validation of the proposed research model has provided support of simultaneously adoption of interaction quality, environment quality, and outcome quality as key factors influencing users' continuance intentions in the context of the use of mobile applications/services. To further extend the contribution of this study, more research that aims to examine the proposed research model using a variety of samples that have a higher degree of representativeness in similar and different contexts is thus needed to further validate it, or refine it by identifying additional variables which can enhance the ability of the proposed research model to explain and predict the satisfaction and continuance intentions of the users of mobile applications/services, such as different dimensions of users' trust in the mobile service providers (as the reflection of the influence of mobile service quality), habit of mobile service users, and other key mobile service quality factors.

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