

# Influence of Information and Service Quality on Users' Continuous Use of Mobile Libraries in China

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## ABSTRACT

This research mainly aims to explore the factors that influence users' continuous use of mobile libraries. The findings of this study will provide empirical evidence to help improve the service and information quality of mobile libraries. Moreover, suggestions for optimization are provided with the objective of meeting user demands at its maximum. A theoretical model is constructed to reveal the impact of 11 influencing factors on users' continuous use of mobile libraries. Structural equation modeling is adopted to verify the theoretical model and research hypothesis based on the valid data obtained from a questionnaire survey. The study found that personalized services and information availability have positive impacts on the service quality of mobile libraries. Moreover, perceived mobility and information quality have positive impacts on the perceived usability of mobile libraries. Finally, perceived usability, service quality, and platform stability have significantly positive impacts on the willingness of users to continue usage of mobile libraries.

## KEYWORDS

Information Quality, Mobile Library, Personalized Services, Platform Stability, Service Quality

## 1. INTRODUCTION

Relying on modern network technology, mobile libraries provide a channel for people to conveniently obtain digital resources whenever and wherever (Wei & Yang, 2017; Hu & Zhang, 2016). As a result, people's growing demand for mobile reading are met and the social reading and service function of traditional libraries further expands and deepens (Wei & Yang, 2017; Hu & Zhang, 2016). The service and information quality of mobile libraries has recently become a hot topic. The International libraries conference has been held in 2007, 2009, 2011, 2012, 2014, and 2016. The theme of the first conference was "exchange of experiences on utilizing mobile devices to provide service," that of the fourth conference was "from marginal to mainstream," that of the fifth conference was "from equipment to person", and that of the sixth conference was "mobile library: intelligent library." These themes reflect the continuity of the research and development of mobile libraries (Jin & Bi, 2017). Some scholars believe that user experience is a factor perceived during the interaction among users, services, and system. Moreover, user experience is believed to be integrated into various sectors of

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the interaction between users and services, and the physical world influences user experience in the virtual world.

Main research achievements primarily include users' demand for mobile libraries from the perspective of user experience, construction of mobile library platforms (Palmer, 2014), current situation of mobile library construction, and service quality evaluation of mobile libraries. Although some studies have quantitatively evaluated the service and information quality of mobile libraries from the perspectives of user perception and experience, no dedicated research has been conducted on the factors influencing users' continuous use of mobile libraries.

Mobile libraries were developed late in China. The Shanghai Library app, which launched in 2010, is one of the earliest library apps. Subsequently, other domestic libraries, such as the National Library of China, Capital Library, and Chongqing Library, developed an app available on Android and IOS. At present, 31 libraries out of 35 domestic public libraries at or above the provincial level have launched mobile library app services. In 2011, Fudan University launched a library app in China for the first time. Since then, major universities have taken an active part in the construction and promotion of library apps. Thus far, 39 "985 universities" have launched mobile library apps. These apps effectively improve the service level and bring more and better experiences to readers.

In this paper, related domestic and foreign literature is summarized. Furthermore, current situations regarding the development of mobile libraries and users' behavioral characteristics and extract factors, including personalized services, information convenience, perceived risk, timeliness, information quality, and information reliability, are considered. A research model for factors influencing users' continuous use of mobile libraries is then constructed based on the psychological experience of users of mobile libraries, such as perceived usability and service quality. The direction and degree of the impact of various factors on users' continuous use of the mobile library are also analyzed. The questionnaire survey method and structural equation method are utilized in this study to examine the influencing factors of users' willingness to continue usage of mobile libraries. The authors of this study aim to provide a guideline that will help China's public and university libraries understand the behavioral characteristics of users and promote the transformation and upgrade of traditional libraries in the mobile Internet environment.

The success of mobile library services depends on whether the technology application is advanced and whether users' perception, acceptance, continuous use, and other behavioral problems are solved. Users are the ultimate receivers of mobile library services. Their views, perception attitudes, and feedbacks directly affect the implementation effect of a mobile library, which is an important symbol of the success or failure of a mobile library construction. However, at present, domestic and foreign libraries have encountered problems, such as low application degree of mobile library apps, insufficient reflection of actual service values, and low willingness of users to continue using mobile libraries. Therefore, a systematic research on the influencing factors of users' continuous use of mobile libraries is of great significance to the construction of mobile libraries.

## **2. LITERATURE REVIEW**

At present, research on mobile libraries focuses on three aspects: (1) in terms of theory, focusing on the connotation, service mode, construction status, and development strategies of mobile libraries; (2) in terms of application, laying emphasis on the usage, user experience, and user demand of mobile libraries; and (3) in terms of technology, focusing on the system analysis and platform design of mobile libraries.

### **2.1. Theoretical Research on Mobile Libraries**

The theoretical research on mobile libraries is led by Europe and America, followed by Japan, South Korea, and Finland. These countries have developed their own mobile library plans in succession, with their services covering book search, book reservation, video guidance, and checking nearby

libraries (Wei et al., 2012). The web publishers represented by Google have also promoted their own mobile book search interface. This development indicated that more comprehensive and systematic theoretical studies have been conducted on mobile libraries. Dedicated to providing mobile resources and services to users, the web publishers represented by Google also proposed the mobile library system framework and advocated the “whenever, wherever, and whatever” service. Most college students are interested in and willing to try mobile libraries. They consider reminder messages, book search, and renewal as the most fundamental and important functions. Jeroen (2015) explored the broad development of mobile fab labs in libraries. Setting up a mobile library fab lab is relatively simple. It is not only awareness based but really necessary.

All countries have conducted detailed surveys and studies on mobile library construction and summarized their characteristics. Gulcin (2017) investigated the current situation of the use of mobile technologies to provide services in university libraries in Turkey. The results showed that many university libraries used mobile technologies to provide information services at a suitable level. Georgios and Panagiota (2014) utilized Shina Library as an example and summarized the social commitments of the mobile library. He considered strengthening the construction of the mobile library as an important approach to fulfill national functions. Some of the latest information technologies have been introduced to the practice area of the mobile library. Wei and Yang (2017) investigated the application of the WeChat library in China’s key universities, and the results showed that the library has become an important mobile service mode for China’s university libraries. Resource retrieval, book lending, personal centers, discovering resources and notices, and announcements have become the most important services. The WeChat library has the advantages of low development cost, automatic cross-platform service, strong user stickiness, and strong interactivity. Xu et al. (2015) investigated the potential use of WeChat to provide service in China’s top 39 university libraries. The results showed that most universities only used the basic functions and some advanced functions needed to be accepted urgently. WeChat library users mainly utilize the automatic reply and interactive functions, which include information retrieval, sharing, and self-service. Li (2013) considered that mobile libraries provide services to users in a friendly manner and consequently meet users’ expectations.

## 2.2. User Demand and Experience on Mobile Libraries

With the development of wireless Internet technology, library users have been able to conveniently query and obtain electronic resources of libraries via mobile terminals. Therefore, understanding the behavioral characteristics of mobile library users is important for understanding user demands, providing better targeted services to users, and saving O&M costs of operating libraries (Xu et al., 2017). At present, many research methods for users’ adoption behaviors have been proposed, such as computer utilization model, rational behavior model, and technology acceptance model (TAM). Hye (2016) researched the factors influencing users’ acceptance of mobile libraries based on TAM. This study introduces TAM to the mobile library service field, modifies TAM, and constructs the model for influencing factors on users’ continuous use of mobile libraries. Moreover, it analyzes the laws of the continuous use behavior characteristics of mobile library users with a questionnaire survey method and structural equation modeling (SEM) and provides a guideline for libraries to provide better services.

The research on mobile library users’ needs is mainly based on empirical investigation. The corresponding mobile library development strategy is formulated based on the investigation and analysis of users’ needs. Zhang et al. (2016) stated that the relationships between source and target positively affect perceived situation efficiency, which in turn shapes intention to use mobile library applications. Perceived usefulness and self-efficacy have a significant impact on users’ willingness to use mobile libraries (Hu & Zhang, 2016). Moreover, their educational level and discipline specialty have a significant impact on users’ willingness to adopt mobile libraries (Hu & Zhang, 2016).

### 2.3. Platform Construction and System Design of Mobile Libraries

Fruitful achievements have been made in the aspects of basic theory and technology research. Accordingly, many universities have improved service quality through the development of a mobile library app system with its own characteristics. Pu et al. (2015) showed that college students have high willingness to continue usage and a positive attitude to the mobile library app system, which improves work efficiency. Wei et al. (2015) believed that mobile apps, although highly effective in improving the efficiency of mobile libraries, still need further improvement as users pay more attention to the usefulness and clarity of an app. Ming and Zhang (2018) showed that the interface and system features of a mobile library app are the external driving factors that affect user satisfaction. However, no unified method for the mobile library data collection currently exists. The choice of mobile librarians has balanced the needs of users to a certain extent. The essence of mobile libraries has no connection with services. Furthermore, the choice of a mobile librarian is influenced by different criteria and not just the user's needs. proposed a mobile library system architecture to implement services anytime and anywhere, Roth et al. (2016) used the Edventure Builder platform to create an interactive online library platform and a building process of a mobile library scavenger hunt, improving the interaction between college students and libraries. In addition, they (2016) introduced numerous examples of mobile technology that can support library services. The mobile augmented-reality technology is also widely used in library management systems to improve applicability, efficiency, and accuracy (Adrian et al., 2014).

To a certain extent, the abovementioned studies involve the quality of information and service quality. However, these studies are only supplementary factors on the study of the continuous usage behavior. Based on the characteristics of contemporary college students with a wide range of interests and ability to accept new things, the use of mobile libraries by this group of people is based on the freshness of new technologies and services and on the need to obtain information services. The development of mobile libraries needs to be based on students' continuous usage behavior (Ming et al., 2017). The continuous usage behavior referred to by the present study is rational and based on value identification. Two factors that affect the sustainability of mobile library users are focused on in this study. The purpose of this study is to highlight the importance of information and service quality. The findings will be applied to maintain college students' continued usage of mobile libraries.

## 3. RESEARCH MODEL AND HYPOTHESES

### 3.1. Service Quality and User Attitude

The quality of information provided by mobile libraries has a certain impact on user satisfaction. The timeliness of information refers to whether mobile libraries update and upgrade information at a speed that can meet users' needs of using and sharing real-time information. Gan et al. (2017) suggested that the technical characteristics of mobile libraries significantly affect users' attitudes. These characteristics in turn significantly affect users' behaviors, which are thought to be a major factor that significantly affects users' adoption of mobile libraries. Furthermore, gender and experience significantly adjust the behaviors of mobile libraries' users. In the research on information ecology theory, Tarhini et al. (2014) believed that the usefulness of online learning has a positive impact on students' learning behaviors. Shahrokh and Harry (2014) believe that information's timeliness has a significant impact on users' acceptance behaviors in an era where the rate of information updates is accelerating. In accordance with the abovementioned research results, the present study proposes the following assumptions:

**H1:** Personalized services have a significantly positive impact on service quality.

**H2:** Information convenience has a significantly positive impact on service quality.

**H3:** Timeliness has a significantly positive impact on service quality.

### 3.2. Information Quality and Perceived Usability

According to the comprehensive literature review, the variables affecting perceived usability include network externality, social impact, interface features, system features, individual differences (domain knowledge), and individual innovations. Mobile libraries provide user-oriented services, which allow users to access information services. Such services include book search, borrowing and renewal, mobile reading, and mobile reference services at any time and from any location. As a result, users can perceive the usefulness and ease of mobile library services. When the user-perceived accessibility is strong, users' willingness to use mobile libraries can be influenced by perceived usability and usefulness. If users frequently encounter difficulties in accessing a mobile library, then they perceive that the mobile library is lacking in usefulness and ease of use, thereby affecting their behavior and willingness to use (Ming, 2013). Perceived mobile library quality positively influences perceived differentiation, perceived situation efficiency, and mobile library adoption intention (Zhang et al., 2016). Hye (2016) showed that perceived usefulness, interactivity, and ease of use significantly influence users' willingness to use mobile libraries and that user satisfaction also positively influences users' willingness to use mobile libraries. In accordance with the research conclusions, this study proposes the following assumptions:

**H4:** Perceived mobility has a significantly positive impact on perceived usability.

**H5:** Perceived risk has a significantly positive impact on perceived usability.

**H6:** The quality of information has a significantly positive impact on perceived usability.

**H7:** Information reliability has a significantly positive impact on perceived usability.

### 3.3. Quality of Service and Users' Willingness to Use Continuously

Perceived usability refers to the amount of effort required by users to use mobile libraries. The mobile library service system directly influences users' perceived usability. In their study on users' satisfaction and the successful model of the mobile library service system, Huang et al. (2015) showed that students' satisfaction with the mobile library service system has a positive relationship with the improvement of the system's efficiency, such as reducing the time spent on searching for books and the cost of access to resources. Ozbek et al. (2014) found that perceived usability has a positive impact on users' usage attitude. In accordance with the research results of the aforementioned literature, a conclusion can be made in which the perceived usability by users in mobile libraries has a positive impact on users' willingness to continue usage. By summing up the aforementioned studies, this study proposes the following assumptions:

**H8:** Service quality has a significantly positive impact on users' willingness to continue usage.

**H9:** Platform stability has a significantly positive impact on users' willingness to continue usage.

**H10:** Perceived usability has a significantly positive impact on users' willingness to continue usage.

In accordance with TAM and the aforementioned research results, this study divides the factors that influence users' continued usage of mobile libraries into perceived usability and service quality. Perceived usability is measured by four factors: perceived risk, perceived mobility, information quality, and information reliability. Meanwhile, service quality is measured by timeliness, personalized service, and information convenience. Users' willingness to continue usage is measured by three factors: perceived usability, service quality, and platform stability. On the basis of the abovementioned assumptions, a hypothetical model is proposed (Figure 1).

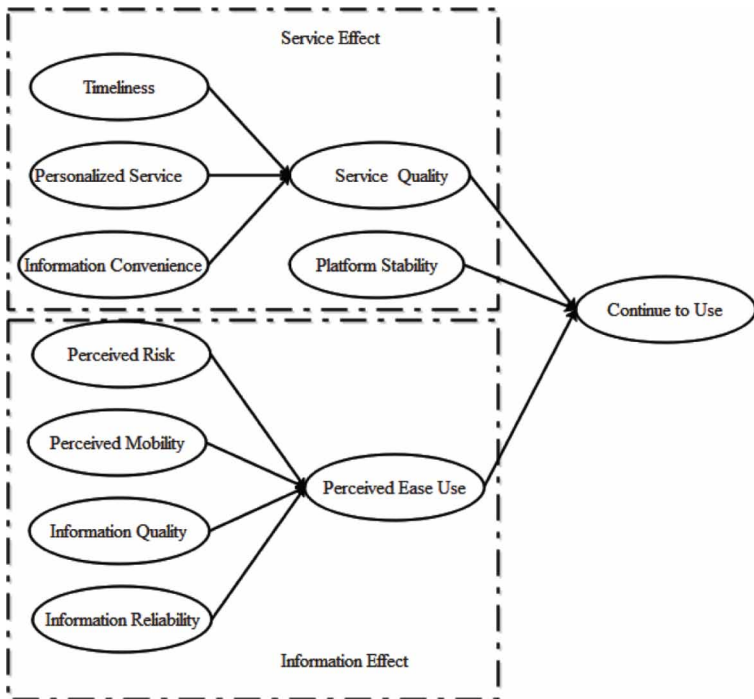
## 4. RESEARCH METHODOLOGY

### 4.1. Sampling and Data Collection

This study collected research data through a questionnaire. The project setting was divided into information and service quality in two aspects. The questionnaire has two parts: The first is the tested individual's information and the second consists of two items based on 11 sub-items, each of which consists of a set of statements. The level of user agreement was measured by a 7-point Likert scale, with 7 points representing the highest level of agreement and 1 point the lowest. The level of agreement was decreased from 7 points to 1 point every step. Before the questionnaire was formally released, 30 graduate students from Wuhan University's E-commerce Laboratory were pre-surveyed, and the questionnaire structure and presentation were adjusted in accordance with the feedback.

The formal questionnaire was distributed to college students on a questionnaire website. A total of 400 questionnaires were collected. After the unqualified questionnaires were removed, a total of 321 valid questionnaires were collected. The questionnaires were in line with the research requirements, and the effective rate reached 80.25%. The sample characteristics statistics of the survey are shown in Table 1. Among the respondents, the percentage of female users is 61.99% and that of male users is 38.01%. The percentage of senior college students and postgraduates is 54.83%, accounting for most of the surveyed subjects. This data indicated that the percentage of senior students using mobile libraries is high. The proportion of respondents majoring in science and engineering is 41.12%, whereas the percentage majoring in psychology, law, and education is only 6.54%. The distribution ratio of users is consistent with that of subjects of colleges and universities. The main purpose of using mobile libraries is to use database resources and read electronic books and magazines, accounting for 41.74% and 27.73%, respectively. The main reasons why users use mobile libraries are time and personal

Figure 1. Hypothesis model



reading habits, accounting for 65.42% and 46.73%, respectively. The main factor influencing user's usage of mobile libraries is the convenience of obtaining information, accounting for 77.26%. The convenience of obtaining information significantly affects users' willingness to use mobile libraries.

## 4.2. Questionnaire and Measurement

In this study, SPSS was used to analyze the information and validity of the questionnaire scale and each latent variable. The overall reliability coefficient of the questionnaire (Cronbach's alpha) is 0.934, the reliability coefficient of each variable is greater than 0.6, and the internal consistency has passed the test. The questionnaire project is based on the maturity scale and confirmed by experts, which means that the content validity can be assured.

Construct validity can be obtained through the Kaiser–Meyer–Olkin (KMO) and Bartlett spherical tests, which yields a KMO value of 0.921 and a Bartlett spherical test value of less than 0.001. A KMO value greater than 0.5 indicates that it is very suitable for factor analysis (Lu & Wang, 2008). Accordingly, the main component accumulated variance of 58.869% is proposed. The validity of the questionnaire was verified by the test, and the results show that the content of the questionnaire has good validity.

As shown in Table 2, the factor loading of each observed variable was between 0.5 and 0.9, which is greater than 0.5 and less than 0.95. Thus, the basic fitting degree index of the scale is ideal. The composite reliability value of each latent variable was between 0.70 and 0.85, which is greater than the evaluation standard value of 0.60. The average variance extracted (AVE) value of each latent variable was between 0.50 and 0.65, which is higher than the standard value of 0.50. Thus, the questionnaire scale has high reliability.

The discriminant validity of latent variables refers to the low correlation or significant difference between the observed variables of different latent variables. In this research, the discriminant validity was tested by the square of the AVE value of each latent variable and the correlation coefficient between this latent variable and other latent variables. The discriminant validity of each latent variable is summarized in Table 3.

The values on the diagonal in Table 6 represent the square root of the AVE of each latent variable, whereas the values that are not on the diagonal represent the square root of the correlation coefficients between the latent variables. The results show that all values on the diagonal are greater than those not on the diagonal. In other words, the discriminant validity of each latent variable of the model is better. The analysis shows that the questionnaire scale of this study has better reliability and discriminant validity, which provides the basis for further analysis.

## 5. DATA ANALYSIS AND RESULTS

In this study, the simulation analysis of the SEM was performed by using Amos23 software. The hypothesis proposed in the theoretical model was studied with the maximum likelihood estimation method. The test was carried out with the survey data.

### 5.1. Parameter Estimation Reasonability Test

Before the overall fitness of the theoretical model was estimated, the rationality of the parameter estimation was checked to verify whether the test model violates the estimation. In the model designed in this study, the standardized parameter estimates did not exceed 0.95, the variance of the measurement error was between 0.091 and 5.747, and no negative variance was found. The correlation coefficient of the standardized estimated value of the covariance of latent variables was between 0.035 and 0.34, which is less than 1. The rationality of parameter estimation indicates that covariance or correlation matrix is a positive definite matrix. In sum, the model estimation results indicate that no violation of estimation exists, and the overall fitting degree test can be conducted.

**Table 1. Demographic information of the respondents**

| Variable                                      | Categories                                | Frequency | Percent |
|-----------------------------------------------|-------------------------------------------|-----------|---------|
| Gender                                        | Male                                      | 122       | 38.01%  |
|                                               | Female                                    | 199       | 61.99%  |
| Grade                                         | Freshman                                  | 11        | 3.43%   |
|                                               | Sophomore                                 | 44        | 13.71%  |
|                                               | Junior                                    | 90        | 28.04%  |
|                                               | Senior                                    | 110       | 34.27%  |
|                                               | Postgraduate and above                    | 66        | 20.56%  |
| Major                                         | Literature, history, and art              | 45        | 14.02%  |
|                                               | Science and engineering                   | 132       | 41.12%  |
|                                               | Medicine and agronomy                     | 38        | 11.84%  |
|                                               | Philosophy, law, and education            | 21        | 6.54%   |
|                                               | Economics and management                  | 85        | 26.48%  |
| Case of using mobile library                  | Eager to find information                 | 170       | 52.96%  |
|                                               | Send debris time                          | 70        | 21.81%  |
|                                               | Personal fixed reading time               | 72        | 22.43%  |
|                                               | Others                                    | 9         | 2.8%    |
| Main purpose of using mobile library          | Check the collection and book             | 59        | 18.38%  |
|                                               | Use database resources                    | 134       | 41.74%  |
|                                               | Read e-books and e-zines                  | 89        | 27.73%  |
|                                               | Watch video resources and audiobooks      | 24        | 7.48%   |
|                                               | Take a look at your leisure time          | 15        | 4.67%   |
| Factors to consider when using mobile library | Costs                                     | 139       | 43.3%   |
|                                               | Time                                      | 210       | 65.42%  |
|                                               | Environment and atmosphere                | 145       | 45.17%  |
|                                               | Personal reading habits                   | 150       | 46.73%  |
|                                               | Operating habits                          | 132       | 41.12%  |
|                                               | Mobile library features                   | 197       | 61.37%  |
|                                               | Safety                                    | 46        | 14.33%  |
| Impact of using mobile libraries              | Access to information is very convenient  | 248       | 77.26%  |
|                                               | Reduce the number of times to the library | 175       | 54.52%  |
|                                               | Change the way of reading                 | 221       | 68.85%  |
|                                               | Make study easier to learn                | 218       | 67.91%  |
|                                               | Increase communication costs              | 9         | 2.8%    |

## 5.2. Overall Fit Test of the Model

In this research, the evaluation index of the overall fitness of the model was divided into the simple fitness, added value fitness, and absolute fitness indexes. The overall model fitting degree test statistics are shown in Table 4. The chi-square ( $\chi^2$ ) freedom ratio (CMIN/DF) was 1.542, which is less than 3.

**Table 2. Results of the confirmatory factor analysis**

| Construct               | Items | Factor Loading <sup>a</sup> | Cronbach's $\alpha$ | AVE   | CR    |
|-------------------------|-------|-----------------------------|---------------------|-------|-------|
| Information Quality     | IQ1   | 0.785                       | 0.763               | 0.586 | 0.850 |
|                         | IQ2   | 0.759                       |                     |       |       |
|                         | IQ3   | 0.750                       |                     |       |       |
|                         | IQ4   | 0.767                       |                     |       |       |
| Perceive Ease to Use    | PE1   | 0.673                       | 0.663               | 0.500 | 0.799 |
|                         | PE2   | 0.719                       |                     |       |       |
|                         | PE3   | 0.672                       |                     |       |       |
|                         | PE4   | 0.757                       |                     |       |       |
| Information Reliability | IR1   | 0.790                       | 0.757               | 0.583 | 0.848 |
|                         | IR2   | 0.738                       |                     |       |       |
|                         | IR3   | 0.716                       |                     |       |       |
|                         | IR4   | 0.806                       |                     |       |       |
| Timeliness              | TM1   | 0.689                       | 0.717               | 0.545 | 0.827 |
|                         | TM2   | 0.795                       |                     |       |       |
|                         | TM3   | 0.712                       |                     |       |       |
|                         | TM4   | 0.752                       |                     |       |       |
| Platform Stability      | PS1   | 0.756                       | 0.750               | 0.573 | 0.843 |
|                         | PS2   | 0.750                       |                     |       |       |
|                         | PS3   | 0.737                       |                     |       |       |
|                         | PS4   | 0.784                       |                     |       |       |
| Personalized Service    | SP1   | 0.748                       | 0.671               | 0.604 | 0.820 |
|                         | SP2   | 0.782                       |                     |       |       |
|                         | SP3   | 0.800                       |                     |       |       |
| Perceived Mobility      | PM1   | 0.809                       | 0.726               | 0.556 | 0.830 |
|                         | PM2   | 0.803                       |                     |       |       |
|                         | PM3   | 0.772                       |                     |       |       |
|                         | PM4   | 0.568                       |                     |       |       |
| Service Quality         | SQ1   | 0.722                       | 0.660               | 0.501 | 0.799 |
|                         | SQ2   | 0.749                       |                     |       |       |
|                         | SQ3   | 0.753                       |                     |       |       |
|                         | SQ4   | 0.594                       |                     |       |       |
| Information Convenience | IC1   | 0.755                       | 0.714               | 0.540 | 0.824 |
|                         | IC2   | 0.806                       |                     |       |       |
|                         | IC4   | 0.699                       |                     |       |       |
| Perceived Risk          | PR1   | 0.797                       | 0.688               | 0.618 | 0.829 |
|                         | PR2   | 0.835                       |                     |       |       |
|                         | PR3   | 0.722                       |                     |       |       |
| Continue to Use         | CU1   | 0.745                       | 0.717               | 0.542 | 0.826 |
|                         | CU2   | 0.756                       |                     |       |       |
|                         | CU3   | 0.727                       |                     |       |       |
|                         | CU4   | 0.716                       |                     |       |       |

Note: <sup>a</sup> All standardized factor loadings were significant at  $p < 0.001$

**Table 3. Results of the discriminant validity analysis**

| Construct | PS    | IC    | TM    | PM    | PR    | IQ    | IR    | SQ    | PST   | PE    |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| PS        | 0.777 |       |       |       |       |       |       |       |       |       |
| IC        | 0.345 | 0.735 |       |       |       |       |       |       |       |       |
| TM        | 0.357 | 0.251 | 0.738 |       |       |       |       |       |       |       |
| PM        | 0.351 | 0.337 | 0.238 | 0.746 |       |       |       |       |       |       |
| PR        | 0.128 | 0.023 | 0.115 | 0.027 | 0.786 |       |       |       |       |       |
| IQ        | 0.267 | 0.352 | 0.207 | 0.254 | 0.189 | 0.765 |       |       |       |       |
| IR        | 0.343 | 0.330 | 0.296 | 0.289 | 0.024 | 0.298 | 0.764 |       |       |       |
| SQ        | 0.421 | 0.463 | 0.030 | 0.460 | 0.165 | 0.421 | 0.442 | 0.708 |       |       |
| PST       | 0.295 | 0.300 | 0.226 | 0.317 | 0.078 | 0.220 | 0.282 | 0.231 | 0.757 |       |
| PE        | 0.304 | 0.367 | 0.218 | 0.323 | 0.112 | 0.352 | 0.307 | 0.248 | 0.280 | 0.707 |

Notes: PS, personalized service; IC, information convenience; TM, timeliness; PM, perceived mobility; PR, perceived risk; IQ, information quality; IR, information reliability; SQ, service quality; PST, platform stability; PE, perceived ease of use

Figures in diagonal are the square root of the AVEs, and off-diagonal elements are correlations of the constructs

Thus, the hypothetical model fits well with the actual sample data. The chi-square value and chi-square freedom ratio were easily affected by the sample size. Thus, when judging the fitness of the model, other fitness index values should be referred to make a comprehensive judgment (Wheaton,1987). The data in Table 5 show that the RMSEA value of the model is 0.041, which is less than 0.07, the GFI value is 0.900, the CFI value is 0.927, the TLI value is 0.911, and the IFI value is 0.929, which are all greater than 0.9. This finding indicates that the overall fitting index of the model has reached the fitting criteria. As a whole, the hypothesis model proposed in this research fits well with the actually observed data, and SEM has better external quality.

### 5.3. Research Hypothesis Test

The results of the estimation based on SEM are shown in Table 5. Seven hypotheses passed the significance test. These hypotheses are consistent with the theoretical analysis and expectation. Personalized service had the greatest impact on service quality, whereas information convenience had the least impact on service quality. Perceived mobility and information quality had a significant impact on perceived usability. Timeliness had no significant effect on service quality. Perceived risk and information reliability had no significant impact on the perceived usability. The service quality had a significant impact on the willingness of continued usage, perceived usability had a significant impact on the willingness of continuous usage, and platform stability had a significant impact on the willingness of continuous usage.

The estimation results of the SEM are shown in Figure 2. The path coefficient of personalized service and service quality of mobile libraries is 0.832, which reached a significance level of 0.001.

**Table 4. Measures of the model fit**

| Fit Index         | $\chi^2/df$ | RMSEA  | GFI   | CFI   | TLI   | IFI   |
|-------------------|-------------|--------|-------|-------|-------|-------|
| Recommended value | < 3         | < 0.07 | > 0.9 | > 0.9 | > 0.9 | > 0.9 |
| Model value       | 1.542       | 0.041  | 0.900 | 0.927 | 0.911 | 0.929 |

Source: <sup>a</sup> According to Bentler and Bonett (1980)

Table 5. Summary of hypothesis tests

| Hypotheses | Standardized Coefficient | S.E.  | C.R.   | Supported |
|------------|--------------------------|-------|--------|-----------|
| H1: PS→SQ  | 0.832***                 | 0.134 | 4.518  | Yes       |
| H2: IC→SQ  | 0.213**                  | 0.079 | 2.109  | Yes       |
| H3: TM→SQ  | 0.011                    | 0.091 | 0.091  | No        |
| H4: PM→PE  | 0.445***                 | 0.112 | 3.948  | Yes       |
| H5: PR→PE  | -0.159**                 | 0.035 | -2.692 | No        |
| H6: IQ→PE  | 0.658***                 | 0.112 | 5.747  | Yes       |
| H7: IR→PE  | -0.034                   | 0.096 | -0.312 | No        |
| H8: SQ→CU  | 0.390***                 | 0.119 | 3.615  | Yes       |
| H9: PST→CU | 0.391***                 | 0.096 | 3.798  | Yes       |
| H10: PE→CU | 0.326**                  | 0.099 | 3.180  | Yes       |

Note: \*\*\* $p < 0.001$ ; \*\* $p < 0.05$

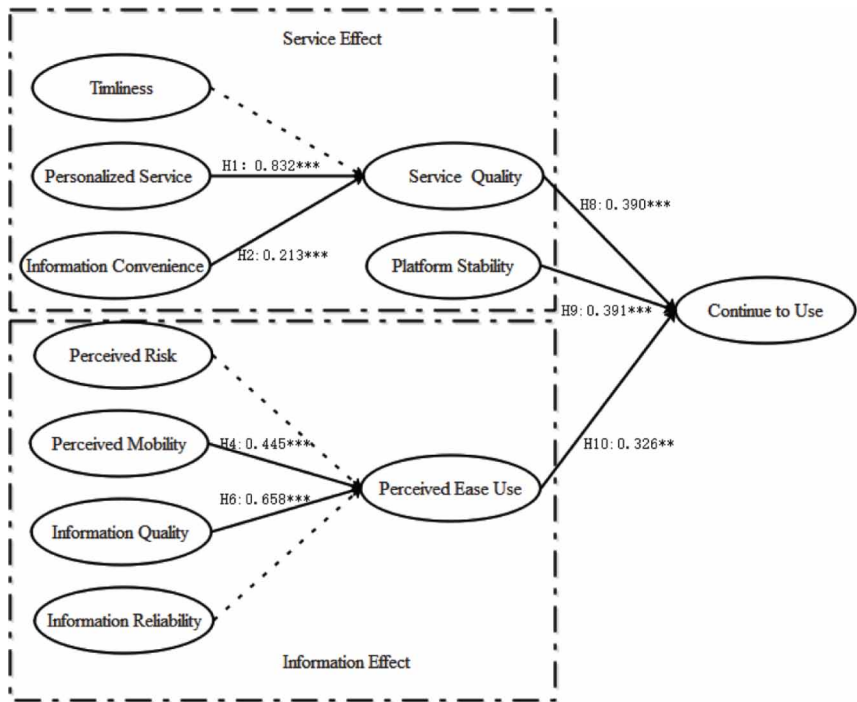
Thus, H1 ( $\beta = 0.832$ ,  $p < 0.001$ ) has been verified. In addition, personalized services provided by mobile libraries had a positive impact on improving service quality. The path coefficient between information convenience and service quality was 0.213, which reaches a significance level of 0.01. Thus, H2 ( $\beta = 0.213$ ,  $p < 0.01$ ) has been verified. Furthermore, the provision of information urgently needed by users of mobile libraries in a convenient and efficient manner has a positive impact on improving service quality. The path coefficient of perceived mobility and perceived usability was 0.445, which reaches a significance level of 0.001. Thus, H4 ( $\beta = 0.445$ ,  $p < 0.001$ ) has been verified. In addition, services provided by mobile libraries in a ubiquitous environment are conducive to enhance perceived accessibility. The path coefficient of information quality and perceived usability was 0.658, which reaches a significance level of 0.001. Thus, H6 ( $\beta = 0.658$ ,  $p < 0.001$ ) has been verified. In addition, information quality provided by mobile libraries are conducive to enhance perceived accessibility. The path coefficient of service quality to the willingness of continuous usage was 0.390, which reaches a significance level of 0.001. Thus, H8 ( $\beta = 0.390$ ,  $p < 0.001$ ) has been verified. Furthermore, the service quality is conducive to enhancing users' willingness of continuous usage. The path coefficient of platform stability to the willingness of continuous usage is 0.391, which reaches a significance level of 0.001. Thus, H9 ( $\beta = 0.391$ ,  $p < 0.001$ ) has been verified. In addition, the platform stability is conducive to enhancing users' willingness of continuous usage. The path coefficient of perceived usability to the willingness of continuous usage is 0.326, which reaches a significance level of 0.01. Thus, H10 ( $\beta = 0.326$ ,  $p < 0.01$ ) has been verified. Furthermore, the perceived usability is conducive to enhancing users' willingness of continuous usage.

## 6. DISCUSSION AND CONCLUSION

### 6.1. Discussion of Findings

In this study, a theoretical model of factors influencing users' willingness to continue usage of mobile libraries was constructed based on the unified theory of acceptance and use of technology model. Such model takes perceived risk, information quality, timeliness, service quality, and personalized service as external variables. Information quality can positively affect users' perceived usability, thus influencing users' behaviors regarding the continued usage of mobile libraries, which has been (Huang et al., 2015). Information and service quality of mobile libraries can positively affect

Figure 2. Results of the proposed model



perceived situation specificity, perceived situation efficiency, and adoption of mobile libraries, which is consistent with the study conclusion made by Zhang et al. (2016). Information and service quality have significant and positive impacts on users' perceived usefulness and perceived mobility. This argument has been proven by previous studies, such as that of Hu and Zhang (2016). Perceived usefulness, interactivity, and perceived usability can significantly influence users' willingness to continue using mobile libraries, which is consistent with the study conclusion made by Hye (2016). Perceived risk variables can negatively influence users' intention to continuously use mobile libraries. This finding is consistent with the study conclusion made by He and Li (2015).

At the same time, this study also proves that personalized services and information convenience are conducive to improving the service quality of mobile libraries. Mobile libraries can provide personalized information services based on users' professional background and information behavior characteristics. As a result, obtaining information needed becomes convenient for users, which is helpful in enhancing users' willingness of continue usage. The significant positive impact of perceived mobility, perceived risk, and information quality on perceived usability is also demonstrated in this study (Deng & Yang, 2014). Mobile libraries can strengthen users' privacy by providing a good mobile information service through technical means and can improve users' willingness to use these libraries by providing the most cutting-edge information. Mobile libraries should also pay attention to users' emotional connection with the system, users, and others, so that users can feel the attention and interaction while using mobile libraries (Li et al., 2015). Enhancing users' willingness to continue usage of mobile libraries is possible by beautifying the interface, timely system feedback, and satisfaction of personalized needs.

## 6.2. Managerial Implications

The theoretical contribution of this study is the introduction of the theory of perceived risk based on the integrated TAM theory and construction of a theoretical model of factors influencing users' willingness to continue the use of mobile libraries. The models combine the demand of information quality and service quality in the service process of mobile libraries as the newly emerged information system. The model reveals the impact of 11 influencing factors on users' willingness to continue the use of mobile libraries in the context of mobile Internet. The results of this study can provide a new research viewpoint and construct a new conceptual model for the analysis of the influencing factors of mobile libraries.

## 6.3. Theoretical Implications

The practical value of this study is the verification of the theoretical model and research hypotheses constructed by applying exploratory factor analysis and SEM in the empirical research method. The empirical research structure indicates that the model can be used. Moreover, the results of the research indicate that perceived risk can negatively influence users' willingness to continue the use of mobile libraries. Personalized services and information convenience can positively affect the quality of service. Perceived mobility and information quality can positively affect information quality. Furthermore, platform stability, service quality, and perceived usability can positively influence users' willingness to continue the usage. In the context of mobile Internet, coordinating the development of various variables is necessary to increase users' willingness to continue the use of mobile libraries and promote the popularization and development of mobile library services.

With the extension of the use time, users' views on mobile libraries gradually become rational, and the positive correlation between social influence and user perception of usefulness becomes weaker. When users decide whether to continue to use mobile libraries, they consider the actual utility and its convenience degree more. With the large increase of mobile network bandwidth and the expansion of the network coverage, users become accustomed to using all kinds of apps in a high-speed and stable network environment. Mobile network is the basis of successful operations of mobile library. In addition, network status directly affects users' perceived ease of use and their further use. With the extension of the use time, mobile library users' behavioral intentions have dynamic differences.

## 7. LIMITATIONS AND FUTURE DIRECTIONS

In this study, the two variables of timeliness and information reliability should be supported by data in theory. However, due to the focus of the data sample selection on college students, an overly small sample size, and inevitable errors in the statistical process, the significance of two influencing factors of timeliness and information reliability did not meet the standard, which is also the limitation of this study. In future research, the sample size can be expanded based on this study to further explore the specific ways various factors affect the mobile library services.

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