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Development and evaluation of the mobile library service system success model

A case study of Taiwan

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Abstract

Purpose – The purpose of this study is to develop and analyse the usage status, level of satisfaction and success model of a mobile library service system in Taiwan. The research results could serve as a reference for the development, evaluation and improvement of libraries' mobile services.

Design/methodology/approach – This study designed a mobile library service system and used the informational system success model to evaluate its use status and level of satisfaction and, thus, to develop a success model for a mobile library service system.

Findings – Results showed that students' level of satisfaction with the mobile library service system had a positive correlation with the usage status indicated that the system could help them to improve their work efficiency, such as by reducing time spent searching for books and cost of obtaining electronic resources. The students also expressed a willingness to continue using the mobile library service system.

Practical implications – In general, the students thought that the mobile library service system could reduce the time needed to search for book-related information, but that the service quality should be improved. Therefore, this study suggests that the education and training of system service personnel should be enhanced and that easy-to-use functions be provided to promote the users' level of satisfaction and willingness to use the system.

Originality/value – This study developed a mobile library service system and invited students studying in the National University of Tainan, in southern Taiwan, to be the subjects in an experiment, with a goal to evaluate the success of a model mobile library. The findings showed that the overall explanatory power (R^2) of this model was 55 per cent and, thus, that the findings of this work have practical significance.

Keywords Information system success model, Library information system, Mobile library service system

Paper type Research paper

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Introduction

With the popularization of wireless networks and mobile devices, more people are now using mobile devices to go online. Wang *et al.* (2012) pointed out that the maturity of third generation mobile services has provided an explosive growth in numbers of mobile Internet users. In addition, more students and teachers now use tablet PCs or smartphones to read e-books or e-journals. As a result, e-resources and digital libraries are becoming increasingly important channels for obtaining information. A large number of libraries have consequently introduced mobile communication technologies into their library services, enabling users to search for information from anywhere and at any time. This indicates that mobile libraries may soon become learners' main resources when seeking to acquire knowledge. This study used the Android operating system to develop a mobile library service system, using the library of the National University of Tainan, in southern Taiwan, as its information source. The aim of this system was to allow students and professors to easily search for books and information, and to provide users with more convenient and practical information services.

In the past, digital libraries emphasized providing a large number of e-books and e-resources to their users. However, with the development of mobile services and the subsequent increase in the user population, this is an inadequate aim. A successful information system needs to take other elements into consideration, such as system quality, willingness to use it, user satisfaction and so forth.

An effective tool that is widely used to evaluate the success or failure of an information system is the information system success model (ISSM), developed by DeLone and McLean in 1992 and updated in 2003. In the past, many scholars had adopted ISSM in various fields to evaluate the success elements of different information systems (Rai *et al.*, 2002). For example, Wang and Wang (2009) combined ISSM and the technology acceptance model (TAM) to discuss instructors' levels of acceptance and satisfaction with web-based learning systems. Wang and Chiu (2011) used ISSM to discuss which elements contributed to the success or failure of an e-learning 2.0 system, while Balaban *et al.* (2013) adopted it to evaluate the success model of an e-portfolio system.

The above-mentioned references show that DeLone and McLean's (2003) ISSM has been widely used to validate the quality of information systems, and to see how quality can directly or indirectly influence the degree to which an information system is used and the level of user satisfaction. Results indicate that for most users, the quality of a mobile library system would be the key factor with regard to their continued use of it. Therefore, to increase the usage rate of a mobile library, this study analysed the usage, user satisfaction and success model of a mobile library service system.

This study used the revised ISSM of DeLone and McLean (2003) as the main research framework, while the research subjects were undergraduate and graduate students who used the focal mobile library service system of the National University of Tainan, in southern Taiwan. This study examined which elements contribute to the success factors of the system. The main purposes of this study were as follows:

- to develop and evaluate the success model of a mobile library service system;
- to understand users' use status and satisfaction with the mobile library service system; and

- to suggest methods for improving the mobile library service system based on the results of this work.

Literature review

Informational system success model

In the field of information management, evaluating the success of information systems has been a widely studied topic (Seddon, 1997). ISSM was developed by DeLone and McLean (1992) and is mainly based on the findings of the communication model produced by Shannon and Weaver (1949) and Mason's (1978) information influence model, as well as a synthesis of over 180 empirical studies on information management that were published between 1981 and 1987 (DeLone and McLean, 1992). ISSM comprises six constructs: system quality, information quality, system use, user satisfaction, impact on individuals and impact on organizations, as shown in Figure 1, and they are described below:

- *System quality*: Evaluation of the information system.
- *Information quality*: Evaluation of the output of the information system.
- *System use*: Evaluation of users' actual use of the information system.
- *User satisfaction*: Evaluation of users' reaction after using the information system.
- *Impact on individuals*: The influence of the information system on users.
- *Impact on organizations*: The influence of the information system on organizational performance.

These six constructs describe the ways in which an information system attains success. For instance, if an information system has high system quality and high information quality, then most users will be satisfied with the system itself and the information produced by it. The system then has a substantial influence on users' work performance or behaviour, which gradually impacts the whole organization. If the influence of the system on individuals or organizations is positive, then the system is a successful one; if negative, the system fails (Chen, 2010).

With advances in information technology, the usage behaviours that occur in relation to information systems have changed significantly (Petter *et al.*, 2008). To improve the applicability of the ISSM and respond to the results of previous experiments and critiques

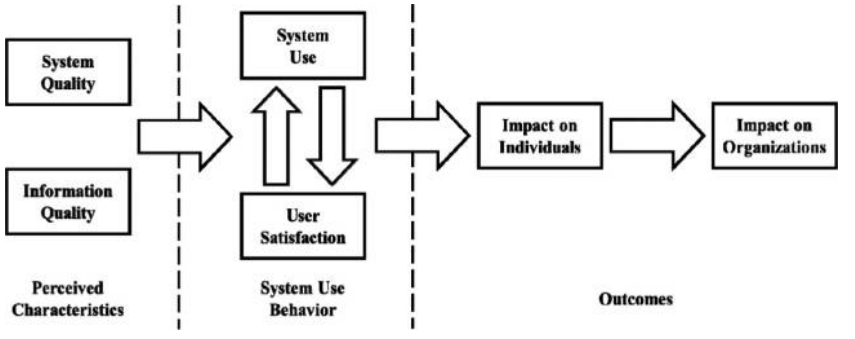


Figure 1.
DeLone and McLean's ISSM (1992)

made by a number of scholars, DeLone and McLean introduced an updated model in 2003. This new model uses information quality, system quality, service quality, intention to use/use, user satisfaction and net benefits to evaluate the success of an information system, as shown in Figure 2. Petter *et al.* (2008) confirmed that the updated ISSM can more effectively analyse and evaluate the factors related to the success or failure of an information system. The six constructs in the updated ISSM are shown in Table I.

The updated ISSM can effectively explain and evaluate user behaviours in relation to an information system, so as to infer the usage intentions and level of satisfaction with it. The updated ISSM is now the most widely used theoretical model adapted by scholars and researchers when evaluating the success of an information system (Wang and Wang, 2009). For example, Garcia-Smith and Effken (2013) used the ISSM to explore nurses' use of a clinical information system, their level of satisfaction and the benefits produced in relation to their work. Balaban *et al.* (2013) developed an electronic portfolio system, and used ISSM to evaluate students' usage intentions and to develop a success model applicable to their system. Chen (2010) used ISSM to empirically study an e-learning system used in enterprises and found that the system actually improved employees' overall performance at work. Therefore, this study adopted the updated ISSM of DeLone and McLean (2003) as a theoretical framework to evaluate and analyse the usage status, level of satisfaction and success model of a mobile library service system.

Mobile library

A large number of libraries have combined their services with mobile technology, resulting in the creation of "mobile libraries" or "M-libraries". In fact, the concept of

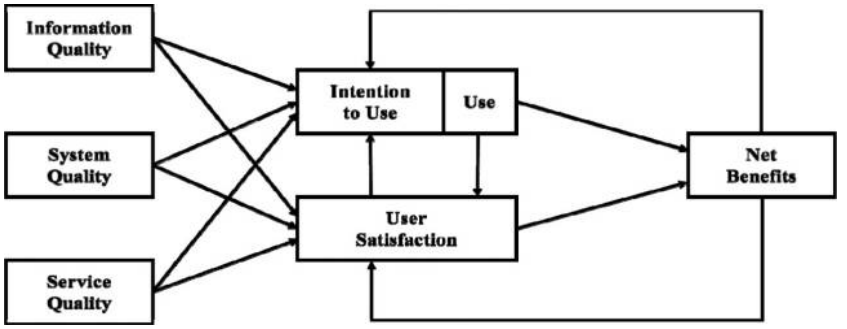


Figure 2. DeLone and McLean's updated ISSM (2003)

Construct	Operational definitions
Information quality	Evaluation of the quality of the information systems' output
System quality	Evaluation of the system performance of the information system
Service quality	Evaluation of service quality that information system providers offer to users
Intention to use/use	Evaluation of the user's actual use behaviour with the information system
User satisfaction	Evaluation of user reactions when using the information system
Net benefits	Evaluation of the benefits that users acquire in the process of using the information system

Table I. Factors in DeLone and McLean's updated ISSM

combining mobile service and library service was first introduced by scholars in the era of personal digital assistants (PDAs). For example, in Balas (2009), a mobile service was developed for use with PDAs to provide library orientation and collection search services. However, the mobile devices and wireless communication technologies were rather immature at that time, which resulted in a low adoption rate.

With the advancement of information technology, wireless networks and mobile devices were developed, allowing people with their use to acquire new knowledge at any time and in any place. Wang *et al.* (2012) pointed out that with the popularization of third generation mobile services, many people now use tablet PCs and smartphones to browse web pages, receive and send e-mails and read electronic books while they are on the subway, riding in buses or traveling in trains. This phenomenon shows that learning is no longer limited to the classroom and regular school hours. As long as learners have a mobile device in hand and access to a wireless network, they can receive guidance and feedback in their learning activities, based on their learning status and environment (Huang *et al.*, 2011).

Recently, wireless communication combined with mobile devices has become an important channel for accessing information. More students and teachers use tablet PCs and smartphones to search for e-journals, e-books and other e-resources (Parsons, 2010). As a result, the majority of libraries combine wireless communication technologies with their services to develop mobile services compatible with mobile devices, which shortens user time in searching for desired information (Lai *et al.*, 2014). The phenomenon indicates that the mobile library has become an important source for learners to acquire knowledge.

Mobile library service system

Traditional digital libraries focus on providing abundant e-books and rich e-resources to their users. However, most libraries still rely on the Internet to provide access to these e-books and e-resources without regard to mobile technologies. For users wanting to search for and read library resources at times and places of their own choosing, the traditional online services that libraries provide are inadequate. In view of this shortfall, this study used the provision of mobile communication service as the main idea and adapted the Android open source code to develop a mobile library service system of the library resources of the National University of Tainan Library. The system allows students and faculty to easily search for information, in the hope of providing more convenient and practical information services to users. The functional architecture of the system is shown in Figure 3.

This study used the Android open source code to develop an application (app) for the mobile library that can be installed on tablet PCs and smartphones. Using this system, faculty and students of the university were able to check the status of books, new book notices and personal book-borrowing and return records, as well as make reservations.

Methodology

Research model and hypotheses

This study is based on the updated ISSM by DeLone and McLean (2003) and thus uses information quality, system quality, service quality, system use, user satisfaction and

Figure 3.
Functional architecture of the mobile library service system

net benefits to evaluate and analyse the college students' usage status and satisfaction with the system, as well as other factors related to the system to provide a success model. The research structure of this study is shown in Figure 4. In addition, this study proposed nine research hypotheses on the relations among the six individual constructs. The definitions of the research variables and the theoretical foundations of each hypothesis are explained as follows:

Information quality evaluates the content quality of the information system. It includes the ability to make corrections, ease of understanding, reliability and completeness of the information, as well as the relations among these (DeLone and McLean, 2003). In an empirical study, Tsakonas and Papatheodorou (2008) pointed out that any assessment of the information quality of an information system used by a digital library should consider the following:

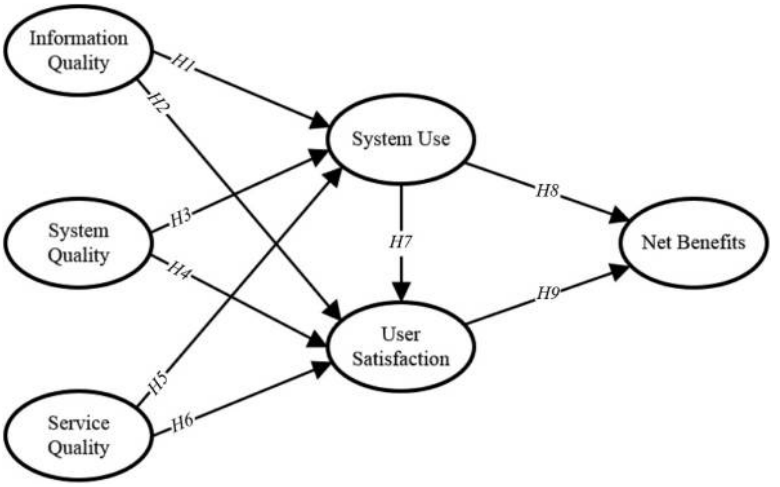


Figure 4.
Research model

- *Relevance*: The information provided is related to the resources that users need.
- *Reliability*: The resources have high credibility and timeliness.
- *Coverage*: The information that users find should include diverse resources from several branches of learning.

Roca *et al.* (2006) adopted the concept of information quality, system quality and service quality, and developed the concept of quality performance. They also proved that the three quality constructs had significant and positive influence on user satisfaction. Therefore, based on the above references and theories, this study proposed the following two hypotheses:

H1. Information quality has a direct and positive influence on the use of the mobile library service system.

H2. Information quality has a direct and positive influence on users' satisfaction with the mobile library service system.

System quality describes the functional quality of the information system and this includes the reliability, usability, ease of use, user friendliness and response time of the system (DeLone and McLean, 2003). In their empirical work, Tsakonas and Papatheodorou (2008) pointed out that the system quality of an information system provided by a digital library should have the following characteristics:

- *Reliability*: The information system could operate in a stable manner.
- *Ease of use*: The functions and operating procedures of the information system should be easy for users to understand and carry out.
- *Response time*: The information system should respond quickly and accurately when users are searching for information.

Therefore, based on the above references and theories, this study proposed the following two hypotheses:

H3. System quality has a direct and positive influence on the use of the mobile library service system.

H4. System quality has a direct and positive influence on users' satisfaction with the mobile library service system.

Service quality is based on user evaluations of the performance of the information system providers' services and includes the concepts of response, guarantee and friendliness (DeLone and McLean, 2003). In their empirical study, Pitt *et al.* (1995) noted that in the information sector, the service quality of service personnel and the system are indispensable elements to the success of an information system. Their findings indicated that excellent service quality not only enables users to complete tasks effectively, but also affects their willingness to use the system. Therefore, based on the above references and theories, this study proposed the following two hypotheses:

H5. Service quality has a direct and positive influence on the use of the mobile library service system.

H6. Service quality has a direct and positive influence on user satisfaction with the mobile library service system

System use is a user's evaluation of his/her usage status in relation to an information system, which includes the overall time spent using it, reasons for using it, degree of use, voluntariness of use and continued intention to use the system (DeLone and McLean, 2003). In empirical research, Davis (1993), Igbaria *et al.* (1997) and Mathieson *et al.* (2001), all found that if users thought an information system could effectively increase their performance at work, then they were more likely to use it on a voluntary basis. This indicates that if the college students thought the mobile library service system could increase the speed of searching for and obtaining the desired books or electronic resources, then they would choose to use it more often, thus indirectly indicating their greater satisfaction with the system. Therefore, based on the above references and theories, this study proposed the following two hypotheses:

H7. The use of the mobile library service system has direct and positive influence on users' satisfaction with it.

H8. The use of the mobile library service system has a direct and positive influence on net benefits.

User satisfaction is a person's emotional reaction after using a certain product or service, such as pleasure or disappointment in comparison to one's expectations before use (DeLone and McLean, 2003; Clerfeuille *et al.*, 2008). In empirical research, Bhattacherjee (2001), Roca *et al.* (2006) and Thong *et al.* (2006) indicated that the level of satisfaction after actually using an information system would impact users' subjective opinions of the system and their willingness to use it again. Bhattacherjee and Premkumar (2004) adopted user satisfaction as an important indicator for evaluating if an information system could help users to improve their performance at work. Therefore, based on the above references and theories, this study proposed the following hypothesis:

H9. The level of user satisfaction with the mobile library service system has a direct and positive influence on net benefits.

Development of instruments

This study evaluated and analysed college students' use of and satisfaction with the mobile library service system, as well as a success model and other factors related to the system, by using a questionnaire survey. The first step in this study was to develop a valid and reliable questionnaire, based on previous studies (Balaban *et al.*, 2013; Wang and Wang, 2009; DeLone and McLean, 2003). Upon completing the first draft of the questionnaire, 15 members of the college faculty were invited to carry out a pre-test, and the wording of some of the items was then modified based on their suggestions.

The questionnaire included a total of 28 items to collect data on respondent demographics (4 items), information quality (4 items), system quality (4 items), service quality (4 items), system use (4 items), user satisfaction (4 items) and net benefits (4 items). The operational definitions of each construct are presented in Table II. The items were answered using the following five-point Likert scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree and (5) strongly agree. The questionnaire is presented in Appendix.

Construct	Operational definitions	References
Information quality	The user's evaluation as to whether the information provided by the mobile library service system is correct, complete and easy to understand	DeLone and McLean (2003), Roca *et al.* (2006), Tsakonas and Papatheodorou (2008)
System quality	The user's evaluation as to whether the mobile library service system is stable	DeLone and McLean (2003), Roca *et al.* (2006), Tsakonas and Papatheodorou (2008)
Service quality	The user's evaluation as to whether the service provided by the mobile library service system is effective and timely	DeLone and McLean (2003), Roca *et al.* (2006), Pitt *et al.* (1995)
System use	The user's evaluation of his/her usage status and intention to continue to use the mobile library service system	DeLone and McLean (2003), Davis (1993), Igbaria *et al.* (1997), Mathieson *et al.* (2001)
User satisfaction	The user's evaluation of his/her emotional status and level of satisfaction after using the mobile library service system	DeLone and McLean (2003), Bhattacherjee (2001), Bhattacherjee and Premkumar (2004), Clerfeuille *et al.* (2008), Roca *et al.* (2006), Thong *et al.* (2006)
Net benefits	The user's evaluation of his/her recognition of improved work performance after using the mobile library service system	DeLone and McLean (2003), Oliver (1980), Thong *et al.* (2002)

Table II.
The operational definitions of the constructs

Data collection

This empirical study used college students at the National University of Tainan, in southern Taiwan, as its subjects. The questionnaire respondents were thus undergraduate and graduate students who actually used the mobile library service system. The questionnaires were completed between 16 December 2013 and 15 January 2014. A total of 300 questionnaires were sent out and 254 were returned, of which 48 of them were invalid and 206 valid, giving an effective response rate of 68.7 per cent.

Data analysis and results

Structural equation modelling was adopted to test the cause-and-effect relations among the constructs in the research model, with the partial least square method used as the analysis tool. The SmartPLS 2.0 M3 software package, developed by Ringle *et al.* (2005), was used to analyse the data, and the results are presented below.

The respondents profile analysis

The respondents' details are presented in Table III. Males accounted for 47.1 per cent of the respondents and females 52.9 per cent. With regard to age, 38.8 per cent of the respondents were 21-30 years old, while those younger than this accounted for 61.2 per cent. Only 9.7 per cent of the respondents were in the second year or higher of graduate school, and 2.4 per cent were in the first year of graduate school, while senior students (including those in higher grades, but not studying in graduate school) accounted for

Demographic characteristic	Frequency	(%)
Gender		
Male	97	47.1
Female	109	52.9
Total	206	
Age (in years)		
Under 20	126	61.2
21-30	80	38.8
Total	206	
Grade		
Second year and above in graduate school	20	9.7
First year in graduate school	5	2.4
Senior student (including higher grades but not studying in graduate school)	27	13.2
Junior student	45	21.8
Sophomore	32	15.5
Freshman	77	37.4
Total	206	
College		
Education	56	27.2
Humanities and social sciences	44	21.4
Science and engineering	91	44.2
Environmental sciences and ecology	11	5.3
Performance and visual arts	4	1.9
Total	206	

Table III. Demographic statistics of the respondents

13.2 per cent, junior students for 21.8 per cent, sophomores for 15.5 per cent and freshman for 37.4 per cent of the total. With regard to the students' colleges, education accounted for 27.2 per cent, humanities and social sciences for 21.4 per cent, science and engineering for 44.2 per cent, environmental sciences and ecology for 5.3 per cent and performance and visual arts for 1.9 per cent.

Reliability analysis

The Cronbach's alpha (α) coefficient was used to test the internal consistency of each construct. The greater the α value is, the greater the inter-correlations of an items' construct are, which indicates higher internal consistency. When the α value is higher than 0.7, this indicates a high level of reliability, and when it is smaller than 0.35, this indicates a low level of reliability (Nunnally, 1978). Table IV shows the α coefficient ranges from 0.809 to 0.919, and thus, the items in this study have good internal consistency and a high level of reliability. In addition, Hair *et al.* (1992) stated that factor loading could effectively explain the reliability of individual constructs in a research model and suggested that the factor loading of each construct should be more than 0.5. Table V shows that the factor loadings of the constructs in this study range from 0.67 to 0.91 and, thus, that they all have good reliability and are able to adequately explain what they are supposed to.

Validity analysis

This study tested the convergent validity of the instrument, which was assessed as the degree of inter-correlation between theoretically related items (Lee *et al.*, 2007). When testing the same construct item, the higher the inter-correlation is, the better the convergent validity of the measurement is. The most used indicator evaluates composite reliability and the average variance extracted (Lee *et al.*, 2007). Fornell and Larcker (1981) suggested that the value of composite reliability should be greater than 0.7, and Table V shows that in this study, this ranges from 0.876 to 0.943, which is greater than the suggested value, thus indicating good internal consistency of all the items. Fornell and Larcker (1981) also suggested that the value of the average variance extracted should be greater than 0.5, and Table V shows that in this study, these ranged between

Table IV.
The measurement model's descriptive statistics and Cronbach's alpha coefficients

Construct	No. of items	Mean	SD	Cronbach's alpha
Information quality (IQ)	4	4.061	0.745	0.894
System quality (SSQ)	4	4.087	0.736	0.881
Service quality (SVQ)	4	3.943	0.777	0.919
System use (SU)	4	3.842	0.807	0.809
User satisfaction (US)	4	3.948	0.698	0.883
Net benefits (NB)	4	3.992	0.763	0.840

Table V.
Factor loadings and convergent validities for the measurement model

Construct	Item	Factor loading	Composite reliability	Average variance extracted
Information quality (IQ)	IQ1	0.91	0.927	0.760
	IQ2	0.90		
	IQ3	0.85		
	IQ4	0.83		
System quality (SSQ)	SSQ1	0.86	0.943	0.737
	SSQ2	0.84		
	SSQ3	0.88		
	SSQ4	0.85		
Service quality (SVQ)	SVQ1	0.87	0.918	0.805
	SVQ2	0.91		
	SVQ3	0.90		
	SVQ4	0.90		
System use (SU)	SU1	0.67	0.876	0.640
	SU2	0.76		
	SU3	0.89		
	SU4	0.86		
User satisfaction (US)	US1	0.86	0.919	0.740
	US2	0.85		
	US3	0.84		
	US4	0.89		
Net benefits (NB)	NB1	0.89	0.893	0.678
	NB2	0.85		
	NB3	0.69		
	NB4	0.85		

0.640 and 0.805. The results thus indicate that all the construct items in this study had good convergent validity.

Discriminant validity analysis

This study used discriminant validity to evaluate the degree of discrimination with regard to one construct item in comparison to the others. Fornell and Larcker (1981) suggested using the square root of a construct item's average variance extracted and a correlation coefficient matrix to evaluate if discriminant validity exists between construct items. When the square root of a construct item's average variance extracted is greater than the correlation coefficient, discriminant validity exists between the construct items. Table VI shows that the square roots of a construct item's average variance extracted (diagonal boldface values in the table) are greater than the correlation coefficients between different construct items (non-diagonal values in the table). This shows that strong discriminant validity exists between the construct items in this study.

Path coefficient and R^2 *analysis*

The path coefficients and predictive power of the research model were then examined. In the path coefficient test, this study mainly tested the correlations between constructs to analyse if these reached significance and to test if the hypotheses were confirmed. This study thus used the bootstrap method to the test model, using the *t*-values to infer and predict the significance of path coefficients and determine if the hypotheses were confirmed (Russell and Henderson, 2005). Moreover, this study used the R^2 values to evaluate the predictive power of the model. Fornell and Larcker (1981) suggested that the R^2 values should be more than 0.3. The higher the R^2 values were, the stronger practical value the research model carried. This means path coefficients and R^2 values could demonstrate the compatibility of the research model with the practical data collected (Pavlou and Fygenson, 2006; Hulland, 1999; Hair *et al.*, 1992).

Table VII shows that the *t*-values of hypotheses *H1*, *H2*, *H3*, *H4*, *H7*, *H8* and *H9* reach the level of significance. This indicates that based on the data obtained from the National University of Tainan students' usage status, satisfaction and net benefits model of mobile library service system, information quality positively influences system use; information quality positively influences user satisfaction; system quality positively influences system use; system quality positively influences user satisfaction; system use positively influences user satisfaction; system use positively influences net benefits; and user satisfaction positively influences net benefits, with path coefficients of

Construct	IQ	SSQ	SVQ	SU	US	NB
IQ	*0.87*					
SSQ	0.83	*0.86*				
SVQ	0.71	0.73	*0.90*			
SU	0.56	0.56	0.47	*0.80*		
US	0.68	0.68	0.57	0.72	*0.86*	
NB	0.56	0.57	0.50	0.66	0.71	*0.82*

Note: Diagonals represent the average variance extracted and the other matrix entries represent the squared factor correlations

Table VI. Discriminant validity of the measurement model

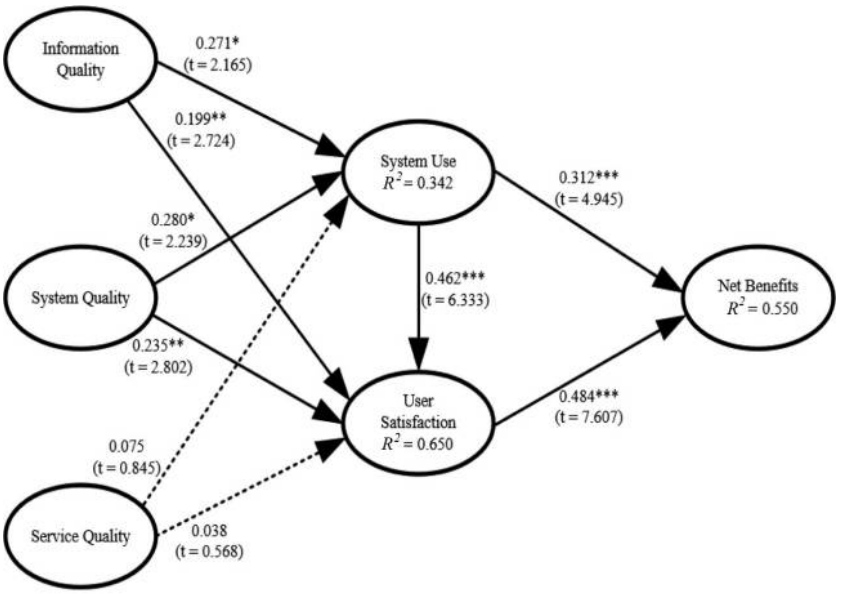
0.271, 0.119, 0.280, 0.235, 0.462, 0.312 and 0.484, respectively. Among all the hypotheses, only *H5* and *H6* did not reach the level of significance. The overall predictive power of the R^2 value was 55 per cent, which indicates that the model developed in the study has good predictive power. The path analysis (β values), *t*-values, R^2 values and other correlation coefficients are shown in Figure 5. The solid lines represent significant *t*-values, while dotted lines show insignificant *t*-values.

Discussion and conclusion

This study developed a mobile library service system for college students and then used ISSM to examine their use of and satisfaction with the system, and further evaluated a related success model. Based on an analysis of the results, seven of the nine hypotheses were supported. The results showed that the students felt the mobile library service

Table VII. Results of the structural model analysis

Hypotheses	Relationship	*T*-value	Path coefficient (β-value)	Result
H1	IQ → SU	2.17	0.27	Supported
H2	IQ → US	2.72	0.20	Supported
H3	SSQ → SU	2.24	0.28	Supported
H4	SSQ → US	2.80	0.24	Supported
H5	SVQ → SU	0.85	0.08	Not supported
H6	SVQ → US	0.57	0.04	Not supported
H7	SU → US	6.33	0.46	Supported
H8	SU → NB	4.95	0.31	Supported
H9	US → NB	7.61	0.48	Supported



Notes: *$p < 0.05$; $t > 1.96$; **$p < 0.01$; $t > 2.58$; ***$p < 0.001$; $t > 3.29$

Figure 5. Results of research model examination with *t*-values displayed

system was helpful when they were searching for books or related information and that they were willing to continue to use it. Details of the results for each hypothesis are presented below.

For *H1* and *H2*, this study found that the information quality of the mobile library service system had a significant influence on system use ($\beta = 0.27$, $T = 2.17$) and user satisfaction ($\beta = 0.20$, $T = 2.72$). This means that the college students generally felt that information quality, such as a clear interface and useful search results, would affect their level of satisfaction and willingness to continue using the system.

For *H3* and *H4*, this study found that the system quality of the mobile library service system had a significant influence on system use ($\beta = 0.28$, $T = 2.24$) and user satisfaction ($\beta = 0.24$, $T = 2.80$). This means that the college students felt that system quality, such as the speed of the system's response and level of system stability, would affect their level of satisfaction and willingness to continue using the system.

For *H5* and *H6*, this study found that the service quality of the mobile library service system did not have a significant influence on system use ($\beta = 0.08$, $T = 0.85$) or user satisfaction ($\beta = 0.04$, $T = 0.57$). This means that the college students generally felt that the service personnel working for the mobile library service system were not able to effectively assist them in eliminating obstacles and help them complete tasks smoothly when problems were encountered. Therefore, with regard to service quality, this study suggests improving the training of service personnel and providing easier-to-use service functions in the system to increase users' level of satisfaction and willingness to continue using the system.

For *H7* and *H8*, this study found that system use of the mobile library service system had a significant influence on user satisfaction ($\beta = 0.46$, $T = 6.33$) and net benefits ($\beta = 0.31$, $T = 4.95$). This means that the college students generally felt that using the mobile library service system allowed them to quickly search for information or electronic resources. Therefore, their level of satisfaction and willingness to continue using the system were both greater.

For *H9*, this study found that user satisfaction with the mobile library service system had a significant influence on net benefits ($\beta = 0.48$, $T = 7.61$). This means that college students generally think using the mobile library service system could help to improve their performance, such as by quickly searching for information and decreasing costs spent obtaining electronic resources. Therefore, their levels of satisfaction and willingness to continue using the system were both stronger.

Based on the results presented above, the major findings of this study are as follows:

- After examining the mobile library service system developed in this study with the updated version of the ISSM (DeLone and McLean, 2003), the results showed that the overall predictive power of the success model was good, with an R^2 value of 55 per cent. This means that the success model developed in this study has good representativeness.
- The college students surveyed in this work felt that the functions of the focal mobile library service system could help them in quickly searching for and obtaining the desired information or electronic resources. This means that their level of satisfaction with the system was high, as was their willingness to continue using it, as well as to recommend it to others.

On the whole, most students are satisfied with the process of using the mobile library service system to search for book information or conduct activities relevant to the mobile library. They also show a willingness of continuous use and would recommend using the system to classmates. They also hope to use the mobile library service system to complete assignments.

In addition, a number of earlier empirical studies have conducted in-depth discussions on information systems (Wang *et al.*, 2012; Shih *et al.*, 2011; Chu *et al.*, 2010). Therefore, although this study included only students from the National University of Tainan, Taiwan, as its subjects and analysed 206 valid questionnaires, the data analysis showed positive results, and the contributions made by this study are representative. The findings of this study can thus serve as the foundation for further research into mobile libraries.

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Further reading

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Appendix

Construct	Item	Question
Information quality (IQ)	IQ1	I think I can understand the information and user interface shown in the mobile library service system
	IQ2	I think information provided by the mobile library service system is clear and easy to read
	IQ3	I think the mobile library service system provides useful information with regard to my search
	IQ4	On the whole, I am satisfied with the information quality of the mobile library service system
System quality (SSQ)	SSQ1	I think the interface of the mobile library service system is easy to understand
	SSQ2	I think the search function in the mobile library service system is easy to use
	SSQ3	I think the response time of the mobile library service system is short and the results are correct
	SSQ4	On the whole, I am satisfied with the system quality of the mobile library service system
Service quality (SVQ)	SVQ1	The user service personnel of the mobile library service system can respond to users' questions in a timely manner
	SVQ2	The user service personnel of the mobile library service system possess adequate professional knowledge and are credible
	SVQ3	The user service personnel of the mobile library service system are attentive, thoughtful and able to interact with users
	SVQ4	On the whole, I am satisfied with the service quality of the mobile library service system
System use (SU)	SU1	I think the mobile library service system can help me to easily borrow books
	SU2	When searching for books, I rely more on the mobile library service system
	SU3	I will continue to use the mobile library service system to search for information about the books that I want to borrow
	SU4	On the whole, I will continue using the mobile library service system
User satisfaction (US)	US1	I think the book search function of the mobile library service system meets my needs
	US2	If I need to search for information about books in the future, then I will choose to use the mobile library service system
	US3	I will recommend the mobile library service system to my classmates and friends if they need to search for information about books
	US4	On the whole, I am satisfied with the use of the mobile library service system
Net benefits (NB)	NB1	I think the mobile library service system can reduce the time I need to search for books
	NB2	I think the mobile library service system can decrease the costs of obtaining electronic resources
	NB3	I think the mobile library service system can increase the amount of books that I borrow
	NB4	On the whole, the mobile library service system is helpful to my book searching process

Table AI.
List of survey items by construct

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