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An analysis of users' continuous use intention of academic library social media using the WeChat public platform as an example

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Abstract

Purpose – This study aims to discover the factors which influence user satisfaction levels and their continuous use intention (CUI) of academic library social media, and then considers how to promote and improve further work on library social media to reduce user churn and increase user satisfaction.

Design/methodology/approach – An updated DeLone and McLean information systems success (D&M ISS) model and the expectation confirmation model for information systems continuance (ECM-ISC) with new variables of emotions are used to examine the factors which influence user satisfaction levels and CUI of academic library social media through 445 questionnaires. Partial least squares structural equation modelling was used to analyse the data and presented in tables.

Findings – The results show that information quality, system quality and emotions affect user satisfaction and CUI, and reveal that emotions can affect that most obviously.

Research limitations/implications – The WeChat public platform is mainly used in China, so the study only focuses on Chinese academic libraries. There are still limitations on the settings of observed variables which cannot cover all the causes of users' positive and negative emotions. In addition, although the respondents of this questionnaire can represent academic library users, 445 samples are still fairly low in contrast to the great number of academic library WeChat public platform users.

Originality/value – This study integrates ECM-ISC and D&M ISS models, adds positive and negative emotions as new variables, to broaden the application scope of these models, and demonstrates the applicability of these two models in the fields of researching academic library social media, expanding and deepening related theories above. This also provides practical reference for academic libraries on how to improve user satisfaction and CUI of academic library social media and academic library WeChat public platforms, promoting the development of academic library social media.

Keywords Academic libraries, Social media, ECM-ISC model, D&M ISS model

Paper type Research paper

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1. Introduction

The innovation of intelligent hardware technology and information systems (ISs) has promoted the rapid development of social network services in social production, life, work, entertainment and other fields (Zhang *et al.*, 2020). Social media, such as Facebook, Twitter, WeChat and Weibo, have rapidly developed large-scale user groups in a short term. According to the *49th Statistical Report on China's Internet Development*, as of December 2021, there were 1.03 billion internet users in China, among whom social media application users comprised 97.5% of the total internet users (CNNC, 2022). Social media not only meets the basic needs of ordinary users, such as social communication, knowledge sharing and self-presentation, but has also become an important marketing and promotion tool for many companies and institutions, including the field of library marketing.

1.1 Problem statement

Many researchers have pointed out that there is a widespread use of social media tools in library marketing, including WeChat, Weibo, TikTok, Facebook, Instagram, YouTube, WhatsApp and so on. These social media are not only used for searching for books and journals, but also for interacting with and sharing knowledge between libraries and communities (Little, 2011). Libraries can promote themselves and interact effectively with users by using social media tools. For example, by offering the "share" and "comment" functionality of social media, such as on WeChat and Facebook, libraries can provide users with information and collect their opinions. Social media tools, such as video-sharing sites, can also provide a more vivid and immediate way to interact with library users. Students or faculty members can watch videos that refer to library services, resources and introductions through video-sharing sites including YouTube, TikTok or Bilibili. The function of live streaming is available in some social media tools, such as QQ, WeChat and TikTok, which can allow librarians and users to interact efficiently online and answer questions quickly.

As social media serves a variety of functions, it has become an incredibly useful tool for library marketing. According to the *State of America's Libraries Report 2014* (ALA, 2014), most libraries in all the population categories have social media accounts, including 93% of the largest ones. A majority (76%) of all academic libraries reported using social media with Facebook, blogs and Twitter being the three most frequently used resources (ALA, 2014). As a result of examining the use of social media applications in Chinese national libraries and 31 provincial public libraries, which offer an extensive range of services and development opportunities, Ding and Li (2016) discovered that 32 libraries used a total of 12 types of social media, with an average social media presence of 3.28 applications per library (Ding and Li, 2016).

It is also important to note that these social media tools played a significant role in library promotion and advertising. According to GSData, the most popular monthly library WeChat public account in September 2022 was the Hunan Library, with 76 tweets and 500,000+ total readings, 4,983 likes and 2,332 shares (GSData, 2022).

In addition, some library activities that were promoted through social media platforms could attract more attention and make a considerable impact. Jinling Library, for instance, organized a video reading campaign *Reading Relay for Love* on TikTok in April 2020, which attracted 983 topics with over 90.37 million views (Jinling Library, 2020).

However, with the rapid development of social media and ISs, users are no longer satisfied with some basic functions and they are increasingly demanding personalized promotion, communication and interaction. Meanwhile, problems, such as low utilization rates and low opening rates, are gradually revealed, and many users also interrupt, shift or quit using certain social media (Xu *et al.*, 2020). A similar problem occurs in the field of

library marketing as well. While libraries expand and innovate their use of traditional information services and provide new services with the help of social media, the problem of library social media user loss and discontinuous use has also emerged (Zhao *et al.*, 2019). The cases of user churn, resource utilization, user satisfaction and library influence would all be affected and how to effectively attract social media users and continuously retain those users have become a challenge for library marketing. However, although there is a great deal of research on users' continuous use intention (CUI) in different fields, few studies have used model analysis and taken specific social media platforms as an example to evaluate users' use intention of library social media.

Therefore, an experimental research design will be used to examine the users' CUI of academic library social media to fill the gaps identified through the literature review. This research will add three different perspectives to the existing research: firstly, taking the library WeChat public platform as an example and using the academic library users as the target population. Secondly, the research integrates the DeLone and McLean information systems success (D&M ISS) model and the expectation confirmation model for information systems continuance (ECM-ISC) by adding two new variables. Thirdly, the paper offers suggestions for the running of academic library social media based on the study results.

1.2 Research questions

For the current study, the authors conducted a questionnaire survey on academic library users and analysed data using the statistical software SmartPLS 3.3.9. This study addressed the following research questions:

RQ1. What factors influence users' CUI of academic library social media?

RQ2. To what extent do each of these factors influence users' intention to continue to use social media at academic libraries?

RQ3. Do emotions affect users' CUI of academic library social media?

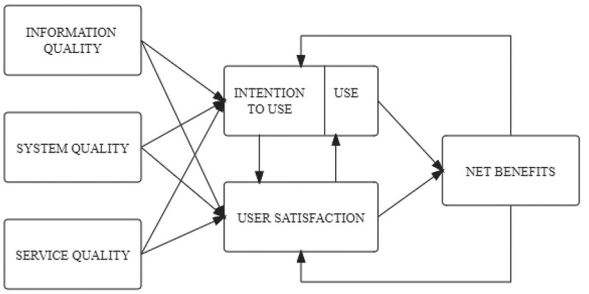
2. Literature review

2.1 Theoretical models

2.1.1 DeLone and McLean information systems success model. DeLone and McLean (1992) introduced a taxonomy and an interactive model, known as the D&M ISS model, as a framework for conceptualizing and operationalizing ISS. This indicates that users evaluate the ISS based on their experience and perception of ISs quality. DeLone and McLean updated this model in 2003 based on a process view, and six interrelated dimensions were identified to measure IS success, including system quality (SQ), information quality (IQ), use/intention to use, user satisfaction, intention to use and net benefit. Amongst these factors, IQ, SQ and service quality have effects on user satisfaction and user intention to use social media platforms, while user satisfaction and intention to use the platforms affect the net benefits of the entire IS (Figure 1) (DeLone and McLean, 2003). McGill *et al.* (2003) pointed out two important contributions of the D&M ISS model: firstly, it provides a scheme for categorizing the multitude of IS success measures that have been used in the literature; secondly, it suggests a model of temporal and causal interdependencies between these categories. The D&M ISS model has received much attention in the IS field and some studies have undertaken empirical investigations to examine the model. Wang and Liao's (2008) research on Taiwan's e-government system showed that IQ and service quality affect the users' adoption of the system, while IQ, SQ and service quality all significantly affect user

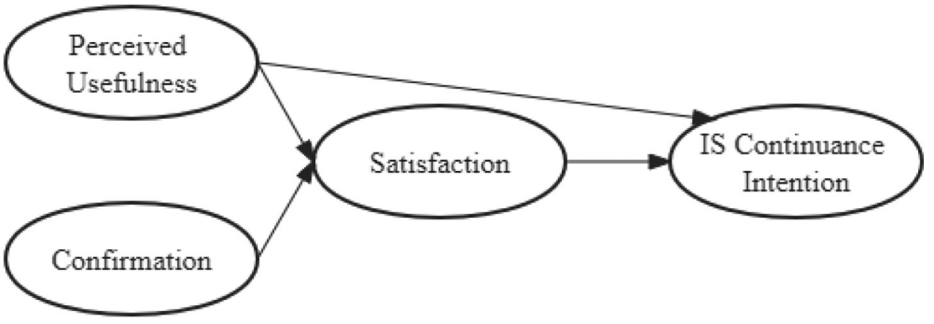
satisfaction. Mohammadi (2015) found that SQ and IQ are the most important factors to promote user satisfaction and use intention to use e-learning systems, while the satisfaction and use intention have a positive influence on the user's actual behaviour. Tam and Oliveira (2016) proposed that user perception of SQ, IQ and service quality of mobile payment systems has a positive impact on user satisfaction, and user satisfaction further affects user behaviour. Sun *et al.* (2017) used this model to examine the WeChat public platform user intention to use, and found that the service quality, IQ and SQ obviously affect user satisfaction and have further effects on user intention to use.

2.1.2 Expectation confirmation model for information systems continuance model. As far as current studies are concerned, the expectation confirmation theory, proposed by Oliver in 1980, is one of the most widely used theories to study continuous use. At first, this theory was mainly used to study consumer satisfaction and post-purchase behaviour (Oliver, 1980). In the early stages of studying user behaviours when using information technology, the technology acceptance model proposed by Davis (1989) was often used. It suggests that perceived usefulness (PU) and perceived ease of use are two critical factors affecting user adoption of information technology. Bhattacherjee (2001) updated these two models and proposed the ECM-ISC, which focused on understanding users' continuance behaviour during the process of IS usage. This model suggests that user satisfaction levels are influenced by their initial expectations and level of confirmation after use, while their intention of continuing use will be influenced by their perception of usefulness and satisfaction (Figure 2).



Source: DeLone and McLean (2003)

Figure 1. D&M information systems success model



Source: Bhattacherjee (2001)

Figure 2. Expectation confirmation model for information systems continuance (ECM-ISC)

After the ECM-ISC theory was put forward, many researchers applied it widely in the research of users' continuous intention to use and behaviours in different situations. All these results validate the applicability and effectiveness of the ECM-ISC model in explaining the continuous behaviour of users (Li and Guo, 2017).

2.2 Continuous use intention of WeChat

In a study of CUI of social media, Barnes (2011) constructed and empirically analysed the influencing factors of users' continuous intention for using them in the digital world. Yin and Zhu (2014) found that user use experience, perceived entertainment, social interaction relationships, satisfaction and user habits have a direct impact on users' continuous use of social networking sites. Wang *et al.* (2014) constructed the continuous use model of social media with social cognitive theory, and found that users' cognition and preference, and special computer self-efficacy is the main factor affecting users' intention of continuous use. Guo *et al.* (2016) have identified the key success factors for the launch of government social media platforms by analysing the formation mechanism of users' willingness to continuously use them.

WeChat, as one of the most widely used social media platforms, has been used as an important marketing tool in over 60% of academic libraries in China (Zhang and Li, 2020). Researchers constructed models based on ECM and carried out empirical studies on influencing WeChat users' CUI and proved that PU, perceived entertainment and satisfaction could all have a direct positive impact on users' CUI (Dai and Liu, 2015; Fan, 2013; Wang, 2015). Zhan and Yan (2014) found that in WeChat satisfaction, perceived ease of usefulness and perceived entertainment have influence on users' CUI from most to least influential. Some researchers explore WeChat CUI through other theories. Ren (2015) used uses and gratification theory to research CUI on WeChat. Given the different distinguishing features between different professions, the information that WeChat promotes and users' needs are also different. For the library WeChat public platforms, Sun *et al.* (2017) carried out research on users' continuous intention based on the D&M ISS model and Zhao *et al.* (2019) combined the D&M ISS model with ECM-IT to study users' CUI of using WeChat public platform of academic library. Both discovered that IQ, SQ and service quality can all have a significant positive impact on user satisfaction and CUI.

To sum up, many researchers have researched users' CUI through different theories. Both ECM-ISC and D&M ISS model have been well examined to be used in these kinds of research. However, some research also points out that CUI is not only affected by users' perceptions but also by emotions which are ignored by both of these two theories (Liu and Sun, 2015).

3. Hypotheses

3.1 Information quality and system quality

Both the original D&M ISS model proposed by DeLone and McLean and further updated D&M ISS model stated that IQ and SQ, which measure semantic success and technical success, have long been considered important quality dimensions of IS (Sun *et al.*, 2017). Other research also finds that user satisfaction with an IS is positively influenced by SQ and information/knowledge quality (Benbya and Belbaly, 2005; Kulkarni *et al.*, 2007; Nattapol *et al.*, 2010). Roca *et al.* (2006) stated that IQ refers to the quality of system output in terms of timeliness, relevance and accuracy, while SQ refers to the functional reliability of the system in terms of user interface consistency, ease of use and documentation quality. They both represent users' evaluations of an IS and have positive effects on user satisfaction. Zhao *et al.* (2019) pointed out that user satisfaction grows with the improvement of the library WeChat public platform IQ and SQ. This study combines previous studies with features of

library WeChat public platforms, defines IQ according to the aspects of timeliness, accuracy, abundance and defines SQ as consistency, ease of use and functionality. Based on the above discussion, the following hypothesis is proposed:

H1. IQ of the library WeChat public platform has a positive effect on user satisfaction.

H2. SQ of the library WeChat public platform has a positive effect on user satisfaction.

3.2 Positive emotion and negative emotion

Researchers such as Yan (2008) and Geng (2008), divided emotions into two dimensions as positive emotion and negative emotion, and studied their effect on customers' repeat purchase behaviour. In addition, researchers also found that emotions were an important factor that could influence customer satisfaction. Oliver (1993) pointed out there are differences between the influences of positive emotion and negative emotion on customer satisfaction, in that customers who experience positive emotion will be more satisfied, and those who experience negative emotion will be less satisfied. Beaudry and Pinsonneault (2010) studied the effects of positive emotions (happiness and excitement) and negative emotions (anger and anxiety) on IT use and stated that positive emotions had positive effects on IT use and negative emotions had negative effects. Zhao *et al.* (2019) pointed out that positive emotion had obvious positive effects on users' continuous use of library WeChat public platforms. Based on the above discussion, this study proposes the following hypotheses:

H3. Positive emotion has a positive effect on user satisfaction on the library WeChat public platform.

H4. Positive emotion has a positive effect on users' CUI of using the library WeChat public platform.

H5. Negative emotion has a negative effect on user satisfaction of the library WeChat public platform.

H6. Negative emotion has a negative effect on users' CUI of using the library WeChat public platform.

3.3 User satisfaction and continuous use intention

As the ECM-ISC theory explains, user IS continuity is similar to consumers' repeat consumption in the business world, since both are determined by their level of satisfaction. User satisfaction is consistently found to have a positive impact on their intention to continue using an IS. The current study proposes:

H7. User satisfaction has a positive effect on users' CUI of the library WeChat public platform.

4. Methods

4.1 Research design

For addressing the gaps in prior studies, and considering the features of the library WeChat public platform, the authors developed a multidimensional research model that simultaneously investigates factors from multiple key dimensions of CUI of the WeChat

public platform of academic libraries, by updating and integrating the two models, D&M ISS and ECM-ISC, with the following steps:

Firstly, the authors extract two variables from the D&M ISS model (Figure 1) that can measure the quality characteristics of ISs: SQ and IQ. To describe SQ, which is a more subjective element based on the interaction between librarians and users, the authors combine it under the variable of positive emotions and use two questions to describe it in the questionnaire.

Secondly, the authors extract two variables from the ECM-ISC model (Figure 2) that reveal the relationship between satisfaction (S) and CUI. Due to the fact that PU and confirmation (C) are elements related more to users' feelings, the authors also put them under the variable of positive emotions.

In addition, for filling in the gaps in primary research and considering the influence of users' emotions on CUI, the authors also added two variables as positive emotions and negative emotions in the model, based on updated ECM-ISC-based models by researchers such as Zhao *et al.* (2019).

Finally, the present model is built. The proposed research model consists of six factors, which are classified into six dimensions as IQ (i.e. timeliness, accuracy and abundance), SQ (i.e. consistency, ease of use and functionality), positive emotion (i.e. emotion, expectation confirmation, habit and switch cost avoiding), negative emotion (i.e. anxiety, burnout and vapidness), user satisfaction and users' CUI towards the WeChat public platform in academic libraries (Figure 3).

4.2 Measurement

The authors adopted the questionnaire survey for data collection. In this questionnaire, the measurement instruments were adapted from previous studies to improve the variability and reliability of the data. A seven-point Likert scale was used to measure the responses of

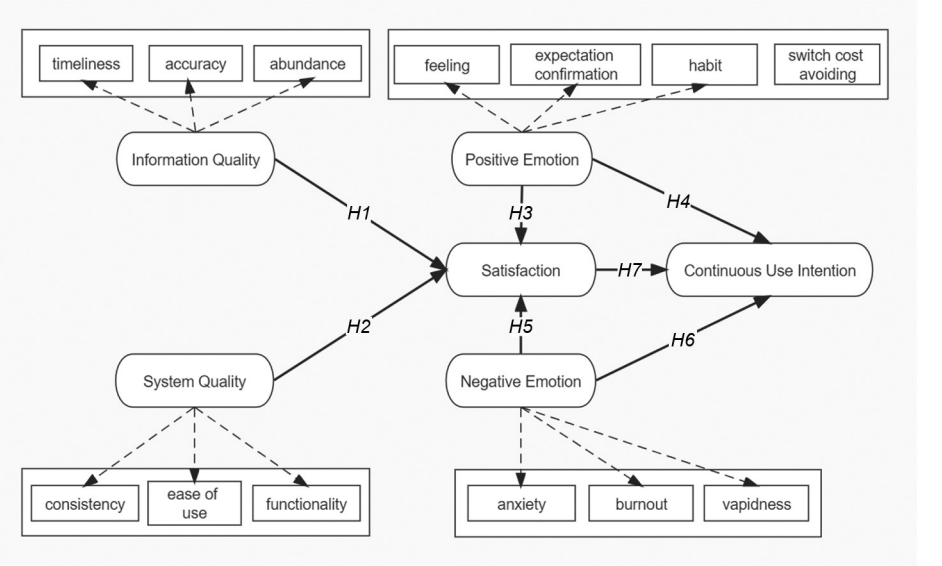


Figure 3.
The proposed research model

Source: Authors' own creation

the individual subjects to the various variables. The questionnaire was developed following the steps shown in Figure 4 (Zhang *et al.*, 2017).

The survey consists of two parts: the first part involves the survey of the demographic characteristics of the WeChat public platform of academic library users which include gender, identity and the time length of using the library WeChat public platform. The other part is a detailed survey of their CUI of the WeChat public platform of the academic library. Based on the proposed research model (Figure 3), this questionnaire is divided into seven blocks and 20 observed variables, as shown in Table 1.

4.3 Data collection

For the purpose of ensuring the validity of the survey, 35 academic library users were chosen as samples during the pilot study. The authors distributed 470 questionnaires in total, in which 390 questionnaires were through the Credamo online survey. The authors used the Credamo system setting to restrict the responders' occupations as student and university staff, to make sure the responders are the users of the academic library. In addition, this research is supplemented by 80 questionnaires distributed offline to random students of the Hubei University of Medicine and the Chengdu University of Technology. The authors received 460 questionnaires back, of which 445 were valid. The validity rate, therefore, is 96.7%.

4.4 Data analysis plan

After collecting the data, partial least squares structural equation modelling (PLS-SEM) was used, which is a modelling that could analyse relationships between variables even in studies with small sample sizes (Hair *et al.*, 2022). Here, the authors chose the statistical software SmartPLS 3.3.9 for two reasons: a key benefit of SmartPLS is that it is a fully-fledged SEM that is highly efficient for evaluating both confirmatory factor analyses and exploratory factor analyses (Henseler *et al.*, 2016), and complex models could be evaluated more accurately using SmartPLS than with covariance-based SEM (Folkinshteyn and Lennon, 2016).

5. Findings

5.1 Sample characteristics

According to Table 2, participants in the study are categorized according to their background characteristics. A majority (55.51%) of the respondents were female, with 44.49% male. By identity, undergraduate students formed the majority (71.24%) because of the larger proportion of the total which undergraduate students make up in universities. By the time length of using the academic library WeChat public platform, most of the respondents have used it for over two years (40.22%), followed by those using it for one to two years (32.36%). Samples can represent users of the academic library WeChat public platform according to gender, identity and time length of use.

Source: Authors' own creation

Figure 4.
The questionnaire development process

Constructs		Measurement statements	Source
Information quality (IQ)	Timeliness	IQ1: The academic library WeChat public platform updates are timely and actively	DeLone and McLean (2003), Li and Guo (2017)
	Accuracy	IQ2: The information provided by the academic library WeChat public platform is accurate and reliable	Li and Guo (2017)
	Abundance	IQ3: Most of the information provided by the academic library WeChat public platform is abundant and rich in content	Zhao *et al.* (2019)
System quality (SQ)	Ease of use	SQ1: I can easily log into the account of the academic library WeChat public platform; the interface design of it is clear and easy to use	DeLone and McLean (2003), Li and Guo (2017)
	Consistency	SQ2: I can log in and access the academic library WeChat public platform rapidly and the system responds well	Li and Guo (2017) Zhao *et al.* (2019)
	Functionality	SQ3: The academic library WeChat public platform is functional, practical and offers many services	
Positive emotion (PE)	Feelings	PE1: The interaction of the academic library WeChat public platform is smooth and effective and makes me feel interested and relaxed	DeLone and McLean (2003) Li and Guo (2017)
		PE2: The academic library WeChat public platform is active and personalized and makes me feel confident and comfortable	Bhattacherjee (2001)
		PE3: The academic library WeChat public platform is helpful for my studies and enriches my life	
	Expectation confirmation	PE4: The academic library WeChat public platform generally meets my expectations and needs	Bhattacherjee (2001)
	Habit	PE5: Compared with using other social media of the academic library, using the WeChat public platform is a natural (automatic) behaviour for me without thinking	Limayem *et al.* (2007) Lankton *et al.* (2010)
	Switch cost avoiding	PE6: If I switch to use other social media instead of the WeChat public platform, I need to readapt, which is troublesome	
Negative emotion (NE)	Anxiety	NE1: I'm anxious about privacy information leakage when using the academic library WeChat public platform	Dinev and Hart (2006) Maier *et al.* (2015)
	Burnout	NE2: I feel tired of using the academic library WeChat public platform sometimes	
	Vapidness	NE3: Sometimes I feel I'm not interested in the content that the academic library WeChat public platform promotes, and even feel bored with information overload	
User satisfaction (US)		US1: I am quite satisfied with the academic library WeChat public platform	Oliver, (1997) Bhattacherjee, (2001)
		US2: I think it is wise to use the academic library WeChat public platform	
Continuous use intention (CUI)		CUI1: I will continue to use the academic library WeChat public platform in the future	DeLone and McLean (2003), Li and Guo (2017)
		CUI2: I will maintain the current frequency or even increase the frequency of using the academic library WeChat public platform in the future	Li and Guo (2017) Zhao *et al.* (2019)
		CUI3: I will not use other social media instead of the academic library WeChat public platform in the future	

Source: Authors' own work

Table 1. Questionnaire of continuous use intention of the WeChat public platform of academic library

Items	No.	Proportion (%)
Gender		
Female	247	55.51
Male	198	44.49
Identity		
College students	36	8.09
Undergraduate	317	71.24
Postgraduate	62	13.93
PhD	10	2.25
University staff	17	3.82
Others	3	0.67
Time of use		
≤ 3 months	15	3.37
3–12 months	107	24.05
1–2 years	144	32.36
≥ 2 years	179	40.22

Source: Authors' own work

Table 2. Sample characteristics

5.2 Data analysis

5.2.1 Scale assessment. The measurement model's evaluation is based on the assessment of internal consistency, convergent validity and discriminant validity (Hair *et al.*, 2022). Coefficient reliability (CR) and Cronbach's alpha are used to measure internal consistency. For CR, an acceptable threshold can be anywhere from 0.60 upwards (Nunnally and Bernstein, 1994), and for Cronbach's alpha, the minimum acceptable value is 0.60 upwards (Churchill and Peter, 1984). Convergent validity is measured using average variance extracted (AVE). The minimum acceptable value for AVE is 0.50 (Hair *et al.*, 2022). As shown in Table 3, the Cronbach's alpha and CR measures were all above the threshold for each of the six constructs, indicating that the scale is internally consistent for all constructs. Convergent validity is also good for all constructs since the AVE values are higher than 0.5.

Discriminant validity is assessed based on the Fornell–Larcker criterion, according to which the AVE of each latent construct/variable should be greater than the latent construct's highest squared correlation with any other latent construct (Fornell and Larcker, 1981). To satisfy the Fornell–Larcker criterion, the values of the elements in the diagonal (which represent the square root of AVE) must be greater than those of the non-diagonal elements, which is a measurement of the correlation between the constructs. From Table 4, it

Construct	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
CUI	0.728	0.846	0.648
IQ	0.704	0.835	0.628
NE	0.793	0.875	0.701
PE	0.837	0.883	0.566
US	0.681	0.862	0.758
SQ	0.707	0.836	0.630

Source: Authors' own work

Table 3. Measurement model: convergent validity and internal consistency measures

is evident that the square roots of each AVE are greater than the correlation coefficient between the constructs, indicating good discriminant validity.

5.2.2 Structural model. The authors calculated the variance inflation factor (VIF) which can show the multi-collinearity of this study (Becker *et al.*, 2014; Benitez *et al.*, 2020). Hair *et al.* (2011) suggested that there are serious problems with collinearity if the VIF value is greater than five. As can be seen from Table 5, both the outer VIF and inner VIF values of constructs are below five, which demonstrates that there is no evidence to suggest that the multi-collinearity problem should be a concern in this study.

In Table 6, the authors analysed the efficiency of this model's predictive power by blindfolding-based cross-validated redundancy measures Q^2 and R^2. For Q^2, the minimum threshold for evaluating the predictive power of the model for small, medium and large rates, respectively, is 0, 0.25 and 0.50 when considering small, medium and large rates. As a result of the obtained values for this proposed model being nearly 0.50, it provides a high level of

Table 4.
Discriminant validity measures as per Fornell–Larcker criterion

Construct	CUI	IQ	NE	PE	US	SQ
CUI	0.805					
IQ	0.657	0.793				
NE	−0.472	−0.434	0.837			
PE	0.751	0.726	−0.427	0.752		
US	0.730	0.697	−0.487	0.765	0.870	
SQ	0.627	0.707	−0.460	0.751	0.691	0.794

Source: Authors' own work

Table 5.
Collinearity (VIF)

Construct	Outer VIF	Inner VIF	
		CUI	US
CUI1	1.429		
CUI2	1.575		
CUI3	1.370		
IQ1	1.412		2.456
IQ2	1.332		
IQ3	1.387		
NE1	1.566	1.327	1.317
NE2	1.948		
NE3	1.684		
PE1	2.772	2.439	2.796
PE2	1.997		
PE3	1.737		
PE4	2.920		
PE5	1.550		
PE6	1.165		
SQ1	1.312		2.702
SQ2	1.449		
SQ3	1.409		
US1	1.364	2.598	
US2	1.483		

Source: Authors' own work

predictability and accuracy according to its high predictive power. R^2 is referred to as in-sample predictive power and it is a measure to estimate the structural model's explanatory power (Sarstedt *et al.*, 2014) that ranges from 0 to 1, and a higher value represents superior explanatory power (Hair *et al.*, 2011). Since the obtained values of this proposed model are around 0.65, the model then provides upper-middle explanatory power. It indicates that there is upper-middle proportion that CUI and US can be explained for being influenced by other constructs, which means the internal structure of the proposed model is satisfactory.

The value of a path coefficient is normally considered to be statistically significant when p value < 0.05(*), fairly significant in the case of the < 0.01 (**) and highly significant when < 0.001 (***) (Shrestha and Vassileva, 2019). Results from the structural model are presented in Table 7. The path coefficients (β) are used to measure the strength of the association between the constructs, while the t-values and p-values reflect the level of significance of those relationships.

It can be seen that the relationship between IQ ($\beta = 0.216$, $t = 4.425$, $p < 0.001$) and satisfaction and positive emotion ($\beta = 0.438$, $t = 8.776$, $p < 0.001$) and satisfaction is highly significant, which confirms that IQ and positive emotion have positive effect on user satisfaction (*H1*, *H3*). The highly significant relationship between negative emotion ($\beta = -0.137$, $t = 3.927$, $p < 0.001$) and satisfaction confirms that negative emotion has a negative effect on user satisfaction (*H5*). The relationship between satisfaction ($\beta = 0.330$, $t = 6.336$, $p < 0.001$) and CUI, positive emotion ($\beta = 0.447$, $t = 8.298$, $p < 0.001$) and CUI are also highly significant, which confirms that user satisfaction and positive emotion have positive effect on users' CUI of using the library WeChat public platform (*H4*, *H7*). In addition, the relationship between SQ ($\beta = 0.147$, $t = 3.047$, $p < 0.01$) and satisfaction, negative emotion ($\beta = -0.118$, $t = 3.139$, $p < 0.01$) and CUI are significant, which confirm that SQ has positive effect on user satisfaction (*H2*) and negative emotion has a negative effect on users' CUI of using the library WeChat public platform (*H6*).

Therefore, the proposed model provides sufficient predictive accuracy considering research objectives, so all of the hypotheses are considered supported.

Construct	R^2	R^2 adj	Q^2
CUI	0.633	0.631	0.401
US	0.654	0.651	0.487

Source: Authors' own work

Table 6. Standard assessment criteria of a structure model

Hypotheses	Path	β	p-values	t-Statistics	Result
H1	IQ → US	0.216	0.000	4.425***	Support
H2	SQ → US	0.147	0.002	3.047**	Support
H3	PE → US	0.438	0.000	8.776***	Support
H4	PE → CUI	0.447	0.000	8.298***	Support
H5	NE → US	−0.137	0.000	3.927***	Support
H6	NE → CUI	−0.118	0.002	3.139**	Support
H7	US → CUI	0.330	0.000	6.336***	Support

Notes: ***$p < 0.001$; $t > 3.29$; **$p < 0.01$ and *$p < 0.05$; β: path coefficients
Source: Authors' own work

Table 7. Hypothesis testing

6. Discussion

From the results by analysing six variables and 20 observed variables through the structural equation modelling, this study proved that some previous research results also work in social media, such as the WeChat public platform, as IQ and SQ have positive effects on user satisfaction and user satisfaction positively affects CUI. More importantly, this study found that users' emotions and satisfaction are correlated in social media, such as the WeChat public platform. The detailed discussion follows.

6.1 Positive emotion

Based on the data analysis, positive emotions have the strongest positive effects on user satisfaction and CUIs in the academic library WeChat public platform. Based on the observed variables (questions) in the questionnaire under this variable, users' positive emotions in this study relate to the academic library social media services about interaction, personalization and helpfulness. Therefore, for improving user satisfaction and users' CUI of the academic library social media, such as the WeChat public platform, the authors put forward the following suggestion:

Embedding diversified services in academic library social media can help to improve interaction (PE1), personalization (PE2) and helpfulness (PE3). This can help to improve users' positive emotions, then positively affect user satisfaction and CUI. Academic library social media, such as the WeChat public platform, could embed services, such as online guided tours of the library, live streaming which can effectively interact with users, respond to consultations promptly and reply to comments quickly. Social media can also embed some services that users can use to find help, such as searching for books, borrowing/renewal, seat booking, lost and found and especially personalized services, such as reading recommendations, resources promotion and so forth.

6.2 Negative emotion

From the results of this study, negative emotions have a highly significant negative effect on user satisfaction in the academic library WeChat public platform. Based on the observed variables (questions) in the questionnaire under this variable, users' negative emotions mainly refer to privacy information leakage (NE1) and information overload (NE3). The academic library WeChat public platform is usually connected to the user's library account. To verify their identity, users often need to input the library card number and password. Therefore, privacy protection should be necessarily strengthened to reduce users' worries and anxiety, therefore, reducing their negative emotions to improve user satisfaction and CUI. On the one hand, social media privacy settings should be updated in a timely manner; on the other hand, the operator should put explanations and reminders on the pages which refer to privacy risks, and ensure the security of any link which is put on the platform.

6.3 Information quality and system quality

IQ has highly significant effects on user satisfaction of the academic library WeChat public platform. IQ mainly refers to the timeliness (IQ1), accuracy (IQ2) and abundance (IQ3) of the content. Therefore, to improve the IQ, the practical value and accuracy of the promoting content should receive attention. For the purpose of abundancy, choice of content should meet users' needs and grasp hotspots, promote content referring to various topics, such as practical information, hot topics, opinion collection and so on. Promotion could combine audio, videos, pictures and text to prevent users feeling bored. For the frequency of promotion, information should be updated in a timely manner but avoid overloading users with information, as mentioned above in sub-section 3.2, to avoid invoking the negative emotion of users.

For SQ, although it has not such highly significant effects as others, it still has significant positive effects on user satisfaction. The observed variables refer to ease of use (SQ1), consistency (SQ2) and functionality (SQ3), which can be improved by updating academic library social media systems with more practical and easy access services. For example, the Nanjing Forestry University library embeds the services "open class", "micro journal" and "cloud reading" in the WeChat public platform which are all convenient for users to easily access through the teaching platform or cloud services, and to directly watch video classes, and read the latest journals and best-selling books. This improves the ease of use and functionality of the WeChat public platform and then increases user satisfaction.

6.4 User satisfaction and continuous use intentions

Same as many previous studies (Dai and Liu, 2015; Fan, 2013; Ren, 2015; Sun *et al.*, 2017; Wang, 2015), this study also proved user satisfaction has a highly significant effect on CUIs of the academic library WeChat public platform, which means the satisfaction level can directly influence users' CUI. Therefore, to improve users' continuous intention to use social media, academic libraries should consider improving the aforementioned services, which can increase user satisfaction and ultimately achieve the goal of increasing users' CUI.

7. Conclusion

To sum up, the authors have used the WeChat public platform as an example to carry out an empirical study on users' CUI of academic library social media. Compared with previous studies, this study integrates the ECM-ISC and D&M ISS models, adding positive and negative emotions as new variables. Furthermore, it discovered that, besides IQ and SQ, both positive emotion and negative emotion can obviously affect user satisfaction and CUI. In addition, it proposes suggestions to improve user satisfaction and CUI, such as embedding diversified services in academic library social media, strengthening users' privacy protection, focusing practical value and accuracy of the promoting content and updating academic library social media systems with more practical and easy access services. This broadens the application scope of the D&M ISS and ECM-IT models and demonstrates the applicability of these two models in the fields of researching academic library social media, expands and deepens related theories. This also provides practical reference for academic libraries on how to improve user satisfaction and CUI of academic library social media and the academic library WeChat public platform, promoting the development of academic library social media.

However, this study also has some limitations: the WeChat public platform is mainly used in China, so the study only focuses on Chinese academic libraries. Although many previous literatures are referenced, there are still limitations on the settings of observed variables which cannot cover all the causes of users' positive and negative emotions. In addition, although the respondents of this questionnaire can represent academic library users, 445 samples are still fairly low in contrast to the great number of academic library WeChat public platform users. In further research, observed variables about emotions can be optimized to cover more comprehensively, and it could optimize the research of international social media and cover more worldwide academic library users with more samples.

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Further reading

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Appendix

Survey Questionnaire

- This questionnaire is about your continuous use intention of WeChat public platform of academic library.
- Please read each question carefully and tick a box to indicate your answer.
- Once you have finished please take a minute to check you have answered all the questions that you should have answered.

Basic information

Q1. What is your gender?

□ Female
□ Male

Q2. What is your identity?

□ College Students
□ Undergraduate
□ Postgraduate
□ PhD
□ University staff
□ Others

Q3. How long have you been the user of academic library WeChat public platform?

□ ⩽ 3 months
□ 3 ~ 12 months
□ 1 ~ 2 years
□ ⩾ 2 years
□

□Continuous use intention of WeChat public platform of academic library

Q1: Academic library WeChat public platform updates are timely and actively.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q2: The information provided by academic library WeChat public platform is accurate and reliable.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

(*continued*)

Q3: Most of the information provided by academic library WeChat public platform is abundant and rich in content.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q4: I can easily log into the account of the academic library WeChat public platform; the interface design of it is clear and easy to use.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q5: I can log in and access the academic library WeChat public platform rapidly, and the system responds well.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q6: Academic library WeChat public platform is functional, practical, and offers many services.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q7: The interaction of academic library WeChat public platform is smooth and effective, make me feel interested and relaxed.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q8: The academic library WeChat public platform is active and personalized, make me feel confident and comfortable.

□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

(*continued*)

Q9: Academic library WeChat public platform is helpful for my studies and enriches my life.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q10: Academic library WeChat public platform generally meets my expectations and needs.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q11:Compared with using other social media of academic library, using WeChat public platform is a natural (automatic) behavior for me without thinking.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q12: If I switch to use other social media instead of WeChat public platform, I need to readapt, which is troublesome.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q13: I'm anxious about privacy information leakage when using academic library WeChat public platform.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

(*continued*)

Q14: I feel tired of using academic library WeChat public platform sometime.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q15: Sometimes I feel I'm not interested in the content that academic library WeChat public platform promotes, and even feel bored with information overload.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q16: I am quite satisfied with the academic library WeChat public platform.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q17: I think it is wise to use academic library WeChat public platform.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

Q18: I will continue to use the academic library WeChat public platform in the future.
□ Strongly agree
□ Agree
□ Somewhat agree
□ Neither agree or disagree
□ Somewhat disagree
□ Disagree
□ Strongly disagree

(*continued*)

Q19: I will maintain the current frequency or even increase the frequency of using the academic library WeChat public platform in the future.

- □ Strongly agree
- □ Agree
- □ Somewhat agree
- □ Neither agree or disagree
- □ Somewhat disagree
- □ Disagree
- □ Strongly disagree

Q20: I will not use other social media instead of academic library WeChat public platform in the future.

- □ Strongly agree
- □ Agree
- □ Somewhat agree
- □ Neither agree or disagree
- □ Somewhat disagree
- □ Disagree
- □ Strongly disagree

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