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Understanding Key Drivers of Mooc Satisfaction and Continuance Intention To Use

Yunfan Lu

Bin Wang
The University of Texas Rio Grande Valley

Yaobin Lu

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Yunfan Lu
College of Economics and Management
Huazhong Agricultural University
Wuhan 430070, China
lyf2006@126.com

Bin Wang
Robert C. Vackar College of Business and Entrepreneurship
University of Texas Rio Grande Valley
Edinburg, TX 78539, USA
bin.wang@utrgv.edu

Yaobin Lu*
School of Management
Huazhong University of Science and Technology
Wuhan 430074, China
luyb@mail.hust.edu.cn

ABSTRACT

Massive Open Online Courses (MOOCs) have attracted global audiences who desire to learn. However, the completion rate of these courses is less than 10 percent. Few studies have systematically researched the influence of expectation-confirmation theory (ECT) and user experience (e.g., flow experience, perceived interest) on user satisfaction of and the continuance intention to use MOOCs. The present study examines the drivers of MOOC satisfaction based on ECT and the influence of satisfaction on user behavior. A research model reflecting the relationships among confirmation, usefulness, interest, flow, satisfaction, and continuance intention to use, and intention to recommend was developed and tested using data collected from 300 subjects. Our findings show that flow and interest are important variables that enhance MOOC satisfaction based on ECT.

Keywords: MOOCs; Expectation-confirmation theory; Satisfaction; Continuance intention to use

1. Introduction

Massive Open Online Courses (MOOCs) are free online classes that have attracted global audiences who desire to learn with the average MOOC size reaching 20,000 [Chen and Chen 2015]. MOOCs have become very popular because of their cost-effectiveness and their ability to provide "access to learning and knowledge which was previously unavailable" [Beigi et al. 2014]. More importantly, MOOCs are beneficial to students who cannot afford face-to-face education at top universities. In order to retain users, MOOC platforms provide useful contents and tools to improve the user experience (e.g., the flow experience and perceived interest). However, the low completion rate is a serious threat to MOOC growth. For example, the average MOOC completion rate is lower than 10% [Alraimi et al. 2015]. In order to promote the development of MOOCs, the platforms should explore strategies to encourage individuals to continue using MOOCs [Admiraal et al. 2014]. This is important because empirical evidence shows that the success of an information system innovation and its long-term sustainability rest on users' continued use [Bhattacherjee 2001].

About 80% MOOC users have an education above the bachelor's degree, appropriately 60% are employed full-time, and 60% are from developed countries [Zhenghao et al. 2015]. As a result, before using MOOCs, users may have formed expectations of online learning. When they use MOOCs, they may expect these online courses to conform to their expectations [Mckeown and Anderson 2016]. Thus, confirmation is essential for users' continuance

* Corresponding Author

usage. At the same time, users' experience is crucial for their continuance usage. That is, MOOC platforms should be perceived to be interesting, as about 72% participants choose MOOCs based on interesting online courses or the learning style [Abeer and Miri 2014]. The platforms should be well controlled to improve users' flow experience [Guo and Poole 2009]. Though users' confirmation and experiences are essential factors influencing MOOCs success, few studies have ever explored how confirmation affects users' experience and continuance intention to use.

Satisfaction is another suitable perspective for explaining MOOC continuance to use [Alraimi et al. 2015]. Specifically, the expectation-confirmation theory (ECT) has been used extensively to explain user satisfaction. ECT posits that expectations and perceived performance can affect a user's satisfaction. When perceived performance meets expectations, confirmation occurs and leads to satisfaction [Alraimi et al. 2015]. Additionally, both perceived interest and flow experience are important user experiences in MOOCs [Hood et al. 2015, McGovern and Baruca 2013]. However, few studies have systematically researched the influence of ECT and user experience (e.g., the flow experience and perceived interest) on user satisfaction. Therefore, the research questions of the current study are:

(1) What is the influence of confirmation on MOOC user experience?

(2) What is the influence of satisfaction on MOOC usage behavior?

The current research makes several theoretical contributions. First, we extend the existing understanding on how expectation-confirmation and user satisfaction are linked. By integrating user experience and expectation-confirmation, we show how factors including perceived interest, flow and expectation-confirmation lead to user satisfaction. Second, we offer a better understanding of MOOC usage behavior as the outcome of user satisfaction. We show how satisfaction leads to user special behaviors that go beyond continuance intention to use. Practically, user experience and expectation-confirmation will promote MOOC effectiveness.

The remainder of this paper is organized as follows. In the next section, we review the relevant literature on ECT, perceived interest, and the flow experience. We then present our research model based on the expectation-confirmation model in the third section. The methodology of this study is discussed in Section 4, followed by data analysis and results in Section 5. Finally, we discuss the findings of this study and conclude with the implications for theory and practice.

2. Literature Review

2.1. MOOC satisfaction

MOOCs have experienced fast growth in the last few years. Today, Coursera, edX, and Udacity are the three major MOOC platforms. MOOCs are classified into cMOOCs and xMOOCs. CMOOCs emphasize creation, creativity, autonomy, and social learning, whereas xMOOCs focus on knowledge duplication through the traditional learning approach including video presentations, quizzes, and testing [Nikola 2014]. Compared with traditional learning in an academic institution, MOOCs offer several advantages. First, they allow learners to interact with each other and freely download all learning resources before they enter the classroom. Second, they can enhance the flipped classroom model [Brahimi and Sarirete 2015]. Third, MOOCs have extended the reach of education to much wider audiences. For working professionals who are unable to enroll in a university to acquire the desired academic knowledge, MOOCs provide them with the opportunities to update their skills. Additionally, MOOCs can even be regarded as a new style of encyclopedia which can improve the professional skills required by the global human resources market [Garito 2016]. Fourth, MOOCs may address education inequities to enhance economic, health, and social development in developing countries [Hyman 2012].

Satisfaction is one of the most important factors that explain a user's continuous use of products or services [Oliver 1993]. Due to the popularity of MOOCs, satisfaction with these courses have captured the interest of academics. Empirical research based on the expectation-confirmation model shows that satisfaction is significantly influenced by perceived usefulness, perceived confirmation, perceived enjoyment, perceived reputation, perceived openness [Alraimi et al. 2015], perceived support, perceived compatibility, and perceived result demonstrability [Islam 2011]. On the other hand, research based on DeLone and McLean's information system success model reveals that satisfaction is significantly influenced by system quality, information quality, and instructional quality [Kim et al. 2012]. Based on user experience in MOOCs, instructor effects, co-learner effects, design and implementation effects [Hone and El Said 2016], flow experience, perceived hedonic value, perceived utilitarian value [Guo et al. 2015], and task interests [Hood et al. 2015] have been shown to affect MOOC satisfaction and retention. Despite these studies on MOOCs, few have systematically investigated the influences of expectation-confirmation, flow experience, and perceived interest on MOOCs user satisfaction and the influence of satisfaction in user's behavior. The current research fills this gap.

2.2. Expectation-confirmation Theory (ECT)

ECT has been used to examine consumer psychology, organizational behavior, and information systems [Brown et al. 2014]. A user's expectation and confirmation are two key antecedents of satisfaction. Confirmation indicates the user's expectation is achieved. On the contrary, disconfirmation means failure to realize the user's expectation. Thus, confirmation is positively associated with satisfaction [Halilovic and Cicic 2013].

Bhattacherjee [2001] extended the expectation confirmation model and proposed that users' confirmation and perceived usefulness of an information system are the most significant factors, which can predict users' satisfaction. Many other studies extended the expectation-confirmation model to further information systems research. For example, Halilovic and Cicic [2013] showed that perceived usefulness, confirmation, and conditions of support are the main factors that influence users' satisfaction. Hu and Zhang [2016] revealed that perceived usefulness, confirmation, ease of use, and users' experiential value are main factors influencing users' satisfaction. Specially, Alraimi et al. [2015] identified perceived reputation, perceived openness, perceived enjoyment, and perceived usefulness as factors enhancing users' intention to continue using MOOCs.

These models indicate that the expectation-confirmation model can be extended. Specifically, the expectation-confirmation model can be used to research the influence of expectation-confirmation in user experience such as ease of use, perceived openness, and perceived enjoyment. However, we know little about how users' experience, such as perceived interest and flow which are essential for MOOC users, influence satisfaction based on the expectation-confirmation model. Accordingly, this study integrates confirmation, perceived usefulness, perceived interest and flow into one extended expectation-confirmation model to investigate factors affecting the satisfaction with MOOCs.

2.3. Users experience

MOOCs are used to attract audiences who desire to learn. Thus, we believe perceived usefulness, perceived interest and flow experience are the most important experiences for users. Perceived usefulness is a basic requirement for MOOC platforms [Alraimi et al. 2015]. Bhattacherjee [2001] proposed that perceived usefulness can predict users' satisfaction. Perceived usefulness has been examined in many MOOC research and is easy to understand, thus we mainly review the literature on perceived interest and the flow experience in the current study.

2.3.1 Perceived interest

Interest refers to the emotion that stimulates the attention to, curiosity about, and concern with a special learning path [Lent et al. 1994]. Individuals tend to cultivate enduring interests in activities, as is seen as capable by themselves [Bandura and Schunk 1981]. Importantly, most participants (72%) choose MOOCs because they believe the courses are interesting [Abeer and Miri 2014]. Perceived interest in MOOCs refers to participants' belief that MOOC contents or the online learning platform can arouse their interest [Hood et al. 2015].

According to motivation theory, motivation is the goal that drives a person to behave in a given situation. The goal is a part of a person's belief about what is essential [Ames 1992]. External motivation involves external incentives such as perceived usefulness or obtaining some rewards. On the other hand, intrinsic motivation involves intrinsic incentives such as perceived inherent gratification [Glynn et al. 2011]. Thus, perceived interest is included as an important intrinsic motivation.

In the MOOC context, many accredited courses posted on MOOC platforms provide new opportunities for learners who desire to learn. These courses are complementary to their professional knowledge or in-classroom courses [Reich 2015]. Participants will take the initiative to register the courses that suit their interests and needs. Specifically, learners manage their own learning and organize when, how, and with what contents they learn based on personal interests [Milligan and Littlejohn 2014]. Thus, participants will follow their goals and interests when enrolling in MOOCs [Barak et al. 2016]. If the learners' academic interest is strengthened, the learning effect will be significantly improved [Ma et al. 2015]. Thus, arousing learners' enduring learning interests is seen as a crucial method to encourage learners to use MOOCs [Zhang 2016].

Despite perceived interest being a key construct to satisfaction with MOOCs, few studies have systematically investigated the influence of perceived interest on MOOCs' evaluation and continuance to use.

2.3.2 Flow experience

Flow is the subjective positive state of mind that happens when individuals are completely immersed in an activity. When users are in the flow state, they will operate at full capacity and increase the level of learning progress [Hong et al. 2016]. Flow is characterized by an intense concentration on the task, where there is an absence of distraction, and where behavior and awareness merge in the performance of the activity at hand [Csikszentmihalyi 1997]. Flow is an intrinsic motivation that includes three core conducts. First, absorption is the most important characteristic and indicates that individuals are involved in the task with intense concentration. Second, enjoyment of the performance of the task indicates individuals' positive state of mind. Finally, intrinsic motivation indicates the task is performed for individuals' intrinsic incentives and not for some external rewards [Nielsen and Cleal 2010].

The antecedents of the flow experience include: (1) the perceived challenges of the flow activity matching the individuals' action capabilities; (2) the flow activity having clear goals; and (3) the flow activity providing timely feedback about how well individuals are achieving the goals [Nakamura and Csikszentmihalyi 2009]. The literature on flow has focused on the precondition of the flow experience [Fullagar et al. 2013].

The flow experience can be achieved when the antecedents of flow are provided [Kiili 2005]. MOOCs provide graphics, sound and online interactivity on an integrated digital platform, which enables participants to not only acquire personalized knowledge but also become more immersed in the online learning environment [McGovern and Baruca 2013]. They satisfy the important goal of making participants totally involved in online learning. Learners who are in the flow state will learn at full capacity and experience enhanced effectiveness and efficiency of using MOOCs [Csikszentmihalyi 2000]. Thus, the flow experience can maximize education outcomes and enhance participant satisfaction.

Though flow experience is important for learners' satisfaction with and growth of MOOCs, few studies have researched the antecedents and influence of the flow experience while using MOOCs. The current research fills this gap.

Based on above literature review, we present our research model and hypotheses based on ECT in the next section. Our research will extend the extant literature on ECT and explore how expectation-confirmation will influence satisfaction and the influence of satisfaction on user's MOOC usage behavior.

3. Research model and hypotheses

Figure 1 summarizes our research model including seven constructs that explain the antecedents and influences of satisfaction for MOOCs. Each of the hypotheses is detailed below.

3.1. The influence of confirmation on learners' experience and satisfaction

According to ECT, the extent of a user's confirmation is one of the most important antecedents to satisfaction [Lee 2010]. Confirmation indicates the evaluation of the realization of the user's expectation. In information systems use, confirmation is positively related to satisfaction [Halilovic and Cicic 2013]. Thus, user satisfaction is determined by the confirmation of their expectation. MOOC users compare the expectations with the actual performance of these courses [Oliver 1980]. When users perceive that the performance of online learning can realize their expectations, confirmation occurs and will lead to satisfaction. Hence, if the confirmation from the MOOC experience is higher, a user will be more satisfied with MOOCs.

H1: Confirmation of MOOC expectation is positively related to MOOC satisfaction.

According to ECT, confirmation is positively related to perceived usefulness [Lee 2010]. MOOCs have attracted global audiences who desire to learn. Learners aim to acquire expected knowledge from MOOCs. Perceived usefulness about MOOCs is not specific before learners have used MOOCs. Based on the confirmation experience, their perception of MOOCs' usefulness may be adjusted [Bhattacherjee 2001]. For example, when learners confirm that MOOCs' usefulness exceeds their initial expectations, they may elevate their perceived usefulness. Hence, we hypothesize:

H2: Confirmation of MOOC expectation is positively related to perceived usefulness.

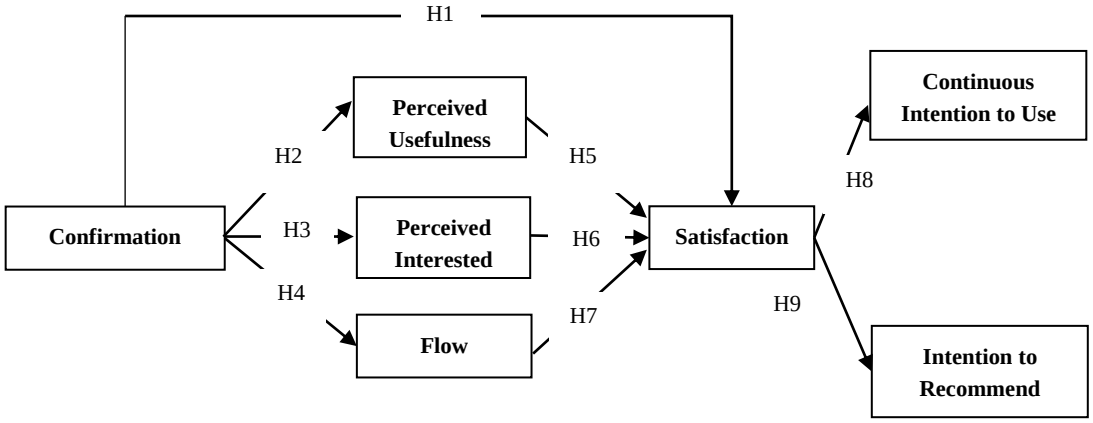

Figure 1. The research model

Most participants (72%) choose MOOCs because they believe the course topics or the online platforms are interesting [Abeer and Miri 2014]. Thus, users' expectations include the perception of interest in the MOOCs. When learners confirm that MOOCs can easily satisfy their favorable expectations, they may view online learning through MOOCs as a gratifying learning style. According to the motivation theory, perceived gratification caused by confirmation of MOOC expectation will lead to users' intrinsic motivation such as perceived interest [Glynn et al. 2011]. Hence, we hypothesize:

H3: Confirmation of MOOC expectation is positively related to perceived interest.

Users are more likely to experience flow when their usage skills match the challenge posed by the task [Shernoff and Csikszentmihalyi 2009]. If the challenge is higher than a user's skill, she may feel anxious and frustrated. Compared with those with better control, users with feelings of less control may not experience flow [Guo and Poole 2009]. Thus, a website should allow users to enjoy their experience and should not disrupt their concentration [Landers et al. 2015]. MOOCs are free online classes and aim to attract global audiences who desire to learn. When users confirm that they can control their online learning based on their personalized needs, they may achieve the feelings of satisfactory control and experience flow. Hence, we hypothesize:

H4: Confirmation of MOOC expectation is positively related to the flow experience.

3.2. The influence of learners' experience on satisfaction

Perceived usefulness satisfies the extrinsic motivation of MOOC users. MOOCs provide convenient access, increased choices, and flexibility. Perceived usefulness is a prerequisite of MOOC success [Limayem and Cheung 2011]. Perceived usefulness refers to perceived MOOC quality, which is related to satisfaction [Freeze et al. 2010]. At the same time, perceived interest is an important intrinsic motivation for taking MOOCs. Several studies confirmed that intrinsic motivation has a significant effect on users' satisfaction in online learning [Lee et al. 2005]. MOOC platforms provide interesting contents for users to arouse their academic interest. Interest is one of the positive emotional dimensions [Machleit et al. 2000], which will lead to MOOC satisfaction [Seligman et al. 2009]. Hence, we hypothesize:

H5: Perceived usefulness is positively related to MOOC satisfaction.

H6: Perceived interest is positively related to MOOC satisfaction.

The flow experience provides many benefits to users including a sense of control over online interactivity, increased learning, and ease of navigation on the website [Landers et al. 2015]. The flow experience will encourage learners' continuous learning through MOOCs. Moreover, the increased learning and enhanced learning performance will lead to learners' satisfaction. Hence, we hypothesize:

H7: The flow experience is positively related to MOOC satisfaction.

3.3. The influence of learners' satisfaction on usage behavioral intention

Satisfaction is perceived as the "perception of enjoyment and accomplishment in learning environment" [Sweeney and Ingram 2001]. Satisfaction is positively related to users' future intention [Oliver 1980]. In e-commerce, satisfaction determines consumers' intention to repurchase [Fang et al. 2011, Thomas et al. 2019]. In online education, if learners have achieved enjoyment and high performance, they will have the self-confidence to complete the MOOCs [Liao and Liu 2012]. Thus, satisfaction may affect continuance intention to use MOOCs:

H8: MOOC satisfaction is positively related to a learner's continuance intention to use.

Much research has verified that satisfaction enhances information technology users' recommendation [Kim 2012] because satisfaction is one of the most important factors that predict a user's altruistic behavior [Di et al. 2010]. In MOOCs, student satisfaction is the most important evaluation about the effectiveness of online learning [Eom et al. 2006]. If users are satisfied, they are more likely to offer the altruistic recommendation to others [Ledden et al. 2011, De Pelsmacker et al. 2019]. Hence, we hypothesize:

H9: MOOC satisfaction is positively related to a learner's intention to recommend.

4. Methodology

4.1. Online survey method

The data used to test our theoretical model were collected from XuetangX, a leading MOOC platform in China that provides online courses for everyone who desires to learn. XuetangX offers about 1300 online courses from the world's best universities such as Tsinghua University, Fudan University, Massachusetts Institute of Technology, and Harvard University. More than 5 million users had registered on XuetangX by 2016. The platform aims to offer the best learning experience to its users. To mirror the profile of typical online learners, our sampling frame included online learners who had experienced online learning within the last six months.

Items of the constructs in the study were adapted from the extant research. Items for confirmation were adapted from Bhattacherjee [Alraimi et al. 2015, Bhattacherjee 2001]. Items for satisfaction were adapted based on Gerlach et al. [Kim et al. 2012, Gerlach et al. 2016]. Items for usefulness were adapted from Davis [1989]. Items for interest

were adapted from Akbulut-Bailey [Akbulut and Looney 2007, Akbulut-Bailey 2012]. Items for flow were adapted from Hong et al. [2016]. Items for intention to recommend were adapted from Ngai et al. [Ledden et al. 2011, Ngai et al. 2007]. Items for continuance intention to use were adapted from Ngai et al. [2007]. The constructs were measured using seven-point Likert scales. The survey instrument is presented in Table 1.

Table 1: Survey Instrument

Confirmation	[Alraimi et al. 2015, Bhattacherjee 2001]
Con1	My experience using MOOCs was better than I expected.
Con2	The service level provided by MOOCs was better than what I expected.
Con3	Overall, most of my expectations of MOOCs were confirmed.
Satisfaction	[Kim et al. 2012, Gerlach et al. 2016]
Sat1	I am satisfied with MOOCs.
Sat2	I enjoyed the learning experience through MOOCs.
Sat3	Overall my experience with MOOCs has been positive.
Perceived Usefulness	[Davis1989]
Use1	Using MOOCs would enhance my learning effectiveness.
Use2	Using MOOCs would improve my learning performance.
Use3	Using MOOCs enables me to acquire more knowledge.
Perceived Interest	[Akbulut and Looney 2007, Akbulut-Bailey 2012]
Int1	I think MOOCs are interesting.
Int2	I am interested in courses on MOOC platforms.
Int3	MOOCs tackle interesting problems.
Flow	[Hong et al. 2016]
Flo1	When I used MOOCs, I was not distracted by the disturbances in the environment surrounding me.
Flo2	When I used MOOCs, I did not feel frustrated or give up.
Flo3	When I used MOOCs, I concentrated on the MOOCs and ignored what was happening around me.
Intention to recommend	[Ledden et al. 2011, Ngai et al. 2007]
Rec1	I would be happy to recommend some courses to anyone considering using MOOCs.
Rec2	I plan to recommend MOOCs to other people.
Rec3	I intend to encourage my friends and relatives to use MOOCs.
Continuance intention to use	[Ngai et al. 2007]
Cu1	I intend to continue to use MOOCs in the future.
Cu2	I plan to use MOOCs in the future.
Cu3	I will continue using MOOCs.

Five professors in e-commerce reviewed our instrument. Based on their suggestions, we modified the items to improve the questionnaire's understandability. Then we conducted a pilot study by inviting 30 subjects to further test and refine the instrument. Finally, we randomly displayed the questionnaire URL to registered XuetangX users. Users who completed the survey were given a small gift as a reward.

4.2. Sample demographics

The online questionnaire's URL was posted on XuetangX's virtual community in September 2016, and we obtained 300 valid responses from the online survey. Table 2 summarizes the sample demographics. About 56.7% of the subjects were male, and 43.3% were female. According to the 38th Statistical Survey Report on Internet Development in China, 53.0% of Internet users in China were male, and 47.0% were female [CNNIC 2016]. There is no statistical difference in gender distribution in the two surveys ($\chi 2(1) = 0.335$, $p=0.570$). The majority (58.3%) of our respondents were between 20 and 39 years old, revealing no statistical difference with the results of the CNNIC survey where 54.6% of Internet users were between 20 and 39 years old ($\chi 2(1) = 0.415$, $p=0.729$). Moreover, 69.0% of our respondents had two years or more of college education, 70.0% of the subjects were employed or students, and 96.3% of the subjects had one or more years of experience using the Internet. These comparisons suggest that our sample is representative of internet users in China.

4.3. Data Analysis

We analyzed the data using partial least squares (PLS) as PLS is less restrictive in sample data distribution, measurement scales, and residual distributions [Chin 1998]. We first examined the measurement model and then tested the hypotheses.

4.3.1 Testing Measurement Model

Principal components factor (PCF) analysis is used to examine the convergent validity of the scales. The Bartlett's test of sphericity generated a Kaiser-Meyer-Olkin (KMO) statistic of 0.935, significant at the 0.01 level,

indicating that the data were suitable for the principal components analysis. We extracted seven factors with eigenvalues above 1, and they explained 85.40% of the total variance. Table 3 presents the factor loadings of the items after applying the Varimax rotation. The results show low cross-loadings and good discriminant and convergent validities. In addition, the largest variance explained by a single factor was 16.306%, showing that none of the factors explained the majority of the variance [Podsakoff and Organ, 1986].

Table 2. Sample Demographics (N=300)

Measure	Item	Count	%
Gender	Male	170	56.7
	Female	130	43.3
Age	>16 and ≤19	79	26.3
	>20 and ≤29	101	33.7
	>30 and ≤39	74	24.6
	>40 and ≤49	46	15.4
Education	High school or below	93	31.0
	Two-year college	64	21.4
	Four-year college	125	41.6
	Graduate school or above	18	6.0
Length of Membership	≤1 year	11	3.7
	>1 year and ≤2 years	112	37.3
	>2years and ≤3 years	160	53.4
	>3 years	17	5.6
Occupation	Working professionals	112	37.3
	Government	26	8.8
	Education	49	16.2
	Students	98	32.7
	Others	15	5.0

Table 3. Principal components factors analysis with Varimax rotation

Item/Factor	1	2	3	4	5	6	7
Flo1	**0.804**	0.086	0.192	0.281	0.165	0.225	0.180
Flo2	**0.729**	0.194	0.206	0.278	0.142	0.176	0.153
Flo3	**0.817**	0.128	0.228	0.234	0.162	0.175	0.235
Con1	0.036	**0.817**	0.195	0.189	0.190	0.140	0.161
Con2	0.221	**0.826**	0.101	0.097	0.185	0.211	0.110
Con3	0.127	**0.837**	0.198	0.033	0.278	0.134	0.117
Rec1	0.118	0.215	**0.778**	0.144	0.198	0.218	0.090
Rec2	0.308	0.131	**0.790**	0.172	0.137	0.122	0.064
Rec3	0.148	0.154	**0.844**	0.122	0.193	0.094	0.161
Int1	0.398	0.100	0.201	**0.691**	0.230	0.192	0.289
Int2	0.406	0.144	0.208	**0.726**	0.228	0.206	0.215
Int3	0.401	0.159	0.215	**0.706**	0.221	0.239	0.240
Cu1	0.180	0.248	0.206	0.119	**0.788**	0.220	0.236
Cu2	0.096	0.344	0.252	0.319	**0.734**	0.116	0.035
Cu3	0.282	0.291	0.230	0.187	**0.724**	0.181	0.168
Use1	0.413	0.293	0.213	0.158	0.220	**0.669**	0.152
Use2	0.315	0.215	0.250	0.218	0.192	**0.704**	0.240
Use3	0.124	0.331	0.210	0.429	0.258	**0.629**	0.195
Sat1	0.416	0.253	0.164	0.278	0.245	0.270	**0.612**
Sat2	0.315	0.213	0.163	0.360	0.202	0.236	**0.687**
Sat3	0.349	0.312	0.255	0.393	0.195	0.189	**0.555**
Eigen values	3.424	2.967	2.718	2.594	2.444	2.041	1.746
Percentage of variance	16.306	14.131	12.942	12.345	11.637	9.7125	8.315
Cumulative	16.306	30.437	43.379	55.733	67.370	77.088	85.404

Table 4 presents additional validity measures of our scales. The standard loadings of the items were mostly above 0.7. The average variance extracted (AVE) for each construct was above 0.5, which means that the scales had a good convergent validity (Bagozzi and Yi 1988). Composite reliabilities (CRs) were used to evaluate the internal

consistency of the measurement model. As shown in Table 4, CRs were all above 0.8, indicating that the scales had good reliabilities. In addition, the Cronbach's alphas were all above 0.7, indicating the scales are reliable [Nunnally 1978].

The correlations among the latent variables are shown in Table 5. The square roots of the AVEs in the diagonal were all larger than their respective correlation coefficients with other factors. This indicates that the scales had a good discriminant validity.

4.3.2 Hypothesis testing results

We next proceeded to test the research model. The findings of this step are summarized in Figure 2. All the hypotheses, including H1 (β=0.181, p<0.01), H2 (β=0.622, p <0.01), H3 (β=0.456, p <0.01), H4 (β=0.428, p <0.01), H5 (β=0.188, p <0.05), H6 (β=0.429, p <0.01), H7 (β=0.216, p <0.01), H8 (β=0.662, p <0.01), and H9 (β=0.556, p <0.01), were supported. The proportions of variances explained were 38.7% for usefulness, 20.8% for interest, 18.3% for flow, 76.3% for satisfaction, 43.8% for continue to use, and 31.0% for intention to recommend.

Because we hypothesize usefulness, interest, and flow as mediators between confirmation and satisfaction, we tested the mediating effects following the procedures proposed by Baron and Kenny [1986]. As shown in Table 6, the relationship between confirmation and satisfaction is partially mediated by usefulness, interest, and flow.

Table 4. Results of Confirmatory Factor Analysis

Construct	Item	Standard loading	AVE	CR	Cronbach's alpha
Perceived Usefulness	Use1	0.9217	0.831	0.937	0.898
	Use2	0.9097			
	Use3	0.9041			
Perceived Interest	Int1	0.9382	0.894	0.962	0.906
	Int2	0.9467			
	Int3	0.9514			
Flow	Flo1	0.9371	0.886	0.959	0.898
	Flo2	0.9311			
	Flo3	0.9549			
Satisfaction	Sat1	0.9170	0.842	0.941	0.941
	Sat2	0.9182			
	Sat3	0.9172			
Intention to recommend	Rec1	0.8807	0.796	0.921	0.935
	Rec2	0.8913			
	Rec3	0.9049			
Conformation	Con1	0.9022	0.831	0.937	0.872
	Con2	0.9127			
	Con3	0.9199			
Continuance intention to use	Cu1	0.9180	0.830	0.936	0.897
	Cu2	0.8947			
	Cu3	0.9193			

Table 5: Correlation among Latent Constructs

Construct	Use	Int	Flo	Sat	Rec	Con	Cu
Use	0.912						
Int	0.729	0.946					
Flo	0.684	0.773	0.941				
Sat	0.762	0.816	0.754	0.918			
Rec	0.586	0.554	0.545	0.556	0.892		
Con	0.622	0.456	0.428	0.587	0.473	0.912	
Cu	0.671	0.639	0.551	0.662	0.580	0.645	0.911

Table 6. Mediating effects testing results

IV	M	DV	IV→DV	IV→M	IV+M→DV	
					IV	M
Con	Use	Sat	0.587**	0.623**	0.184**	0.648**
Con	Int	Sat	0.587**	0.458**	0.270**	0.693**
Con	Flo	Sat	0.587**	0.432**	0.323**	0.617**

Notes: p*<0.05, p**<0.01.

5. Discussion

The present study examines two main research questions. The first one is how to improve MOOC satisfaction based on ECT. The second one focuses on the influences of satisfaction on user behavior including continuous intention to use and intention to recommend. Based on a questionnaire survey of MOOC users, our research has the following main findings.

5.1. The antecedents of confirmation on satisfaction

Our results show that confirmation has both significant direct and indirect effects on MOOC satisfaction. Confirmation directly leads to online learners' satisfaction with MOOCs, corroborating results of a previous study [Alraimi et al. 2015]. More importantly, as indicated by the mediating effects in Table 6, the indirect influence of confirmation via usefulness, interest, and flow is also significant. Hence, confirmation is a key factor that improves user satisfaction in MOOCs.

Usefulness indicates the important and necessary functional value of MOOCs for users' satisfaction. If MOOCs are perceived to be useful, the learner will be satisfied. This result is inconsistent with those from previous studies, where perceived usefulness is not significantly related to satisfaction [Kim 2012, Alraimi et al. 2015]. As MOOCs are more beneficial to students who cannot access face-to-face education [Hone and El Said 2016], the users might view this MOOC benefit as the main driver of satisfaction formation. Specifically, they may wish they could obtain more desirable knowledge from satisfactory MOOCS. Thus, perceived usefulness is significantly related to satisfaction.

Interest has a significant influence on satisfaction, indicating that user satisfaction is easily established in fun or enjoyable online courses. As online learning is an emotional experience [Frijda 1986], MOOCs should provide interesting contents and enjoyable online learning tools to make users satisfied with their experiences [Hood et al. 2015]. Specifically, MOOCs that can strengthen users' academic interest will arouse their satisfaction [Wan et al. 2012]. In addition, MOOC platforms that can provide users with enjoyable experiences will enjoy higher user satisfaction [Chen et al. 2015].

Flow significantly influences users' satisfaction, indicating the optimal psychology state is a key antecedent of users' satisfaction [Bakker 2008]. Users take MOOCs to obtain desired knowledge. The platform should facilitate a favorable environment that allow users to concentrate on the online courses [Hong et al. 2016]. Specifically, factors such as perceived vividness of the online courses and perceived control about the platform may improve the perception of the flow experience [Lin and Joe 2012].

5.2. The influence of satisfaction on user behavior

Our results reveal that satisfaction is a significant determinant of user behavior such as continuous intention to use and intention to recommend. The proportions of variances explained were 43.8% for continuous intention to use and 31.0% for intention to recommend. These results are consistent with those from prior research [Alraimi et al. 2015] and suggest that satisfaction is the right way to enhance the effectiveness of MOOCs.

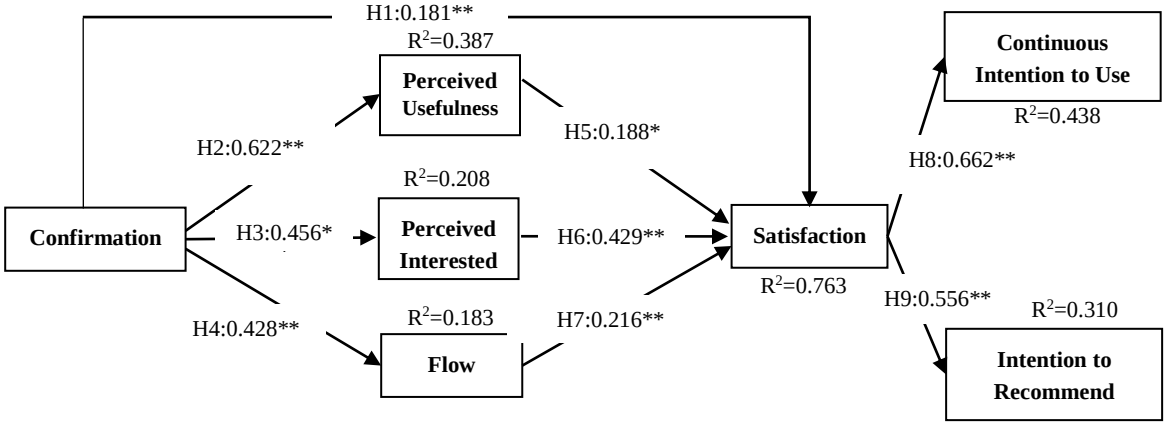

Figure 2: Model testing results (p*<0.05, p**<0.01)

6. Implications

6.1. Theoretical implications

Few researches have examined the factors that influence the continued use of MOOCs [Alraimi et al. 2015]. The current research fills this gap by examining MOOC satisfaction through the lenses of the ECT. This research makes

two contributions to theory. First, the study extends the ECT model, indicating that usefulness, interest, and flow can enhance users' satisfaction with MOOCs. The importance of perceived usefulness and perceived interest reveals that online learning is an emotional and cognitive experience. Flow experience indicates that online learning requires a special environment that allows users to concentrate on the desired contents. Our research provides an integrated understanding of the formation of satisfaction toward MOOCs. Our results show that perceived usefulness, perceived interest, and flow experience have significant mediation effects between confirmation and satisfaction. Hence, considering user experience can be instrumental in understanding user satisfaction based on ECT.

Second, the current study complements the literature on the effectiveness of MOOCs based on ECT. Recommendation is becoming more and more important for consumption decisions. For example, 70% of consumers trust the recommendations from other consumers when they make their adoption or consumption decisions [Dewan et al. 2017]. By studying the influences of satisfaction on intention to recommend, our study complements other research on the antecedents of users' recommendation behavior. Additionally, our study reveals that satisfaction is a key driver of intention to continue to use MOOCs. The current study contributes to research on the effectiveness of MOOCs based on ECT.

6.2. Practical implications

This research can help MOOC platforms enhance MOOC effectiveness and promote MOOC participation. First, MOOC platforms should meet the users' expectation by providing useful and interesting contents and enhancing learners' flow experience. MOOC platforms should understand their customer to better satisfy their needs. In addition, satisfaction is an important factor that promotes learners' intention to continue using and intention to recommend MOOCs. Positive word-of-mouth is necessary for the growth of MOOC platforms. Hence, MOOC platforms should consider embedding links on social media websites to encourage users to recommend their online courses. Finally, online educators should provide useful and interesting contents to stimulate interactions among the participants and use vivid cases, attractive and engaging teaching methods. These strategies allow the teachers to serve the learners' needs and realize their expectations.

7. Limitations and future research

The current study has three limitations. First, the online survey method is used in this research. Future research can use experiments or case studies to cross validate our results. Second, the study focuses exclusively on the ECT. Other theoretical perspectives may also explain MOOC usage [DeLone and McLean 1992]. Future research can examine online learning through these other perspectives. Third, future studies can explore the roles of other constructs such as gender [Bardeen and Stevens 2015] and social influence [Venkatesh and Morris 2000] on learners' MOOC usage behavior. Fourth, the current research focuses on the continuous intention to use MOOCs. Future research can examine users' continuous intention to complete a MOOC to identify factors that enhance MOOC completion rates.

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