

## Article

# Accessing the Influence of User Relationship Bonds on Continuance Intention in Livestream E-Commerce

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**Abstract:** With the rapid development of livestream e-commerce, enhancing user's continuous use of livestream e-commerce has become a focus of livestream e-commerce operators, but the mechanisms have not gone through much exploration by which relationship bonds affect continuance intention. Therefore, this study proposes and validates a new theoretical model based on relational bonds to systematically investigate the relationship between relational bonds, cumulative satisfaction and continuance intention in livestream e-commerce scenario, and discusses the boundary role of affective commitment in it. A valid sample of 546 livestream e-commerce users was used for structural equation modeling analysis. The results found that the effects of social bonds and structural bonds on cumulative satisfaction were significant, but the effects of financial bonds were not significant; the effects of cumulative satisfaction on continuance intention were significant; and affective commitment had a positive moderating effect on the relationship between cumulative satisfaction and continuance intention. This study examines the practical effects of continuance intention of livestream e-commerce users and provides a reference for the operation management and business practice of livestream e-commerce.

**Keywords:** livestream e-commerce; relational bonds; cumulative satisfaction; affective commitment; continuance intention



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## 1. Introduction

In recent years, with the rapid development of information technology, Facebook, Twitter, Little Red Book and other kinds of smart mobile terminals have become popular, triggering the growth and development of e-commerce platforms [1]. Under this circumstance, livestream e-commerce as the advanced development form of mobile commerce has become the focus of the real industry and academia, and will continue to lead the development of mobile commerce, shaping people's new way of life and work [2]. After experiencing rapid development, livestream e-commerce market gradually enters a period of stable development. From the dissatisfaction of traditional e-commerce platforms and emerging short video platforms and other means competing for users, it is not easy for livestream e-commerce developers to win users in the market competition [3]. Therefore, winning the favor of mobile users and improving their continuous use have become strategic issues for the sustainable development of livestream e-commerce. Relational bonds can provide a strong explanation for this. That is, the subscribers that switch may be those attracted by the operator through financial bonds, and the subscribers that remain may be those retained by the operator through social bonds or structured bonds [4,5].

Among existing studies, the continuance intention of livestream e-commerce users has been explored, but there is no clear understanding of the factors influencing the persistent behavior of livestream e-commerce users [6]. In some research, the Technology Acceptance Model (TAM) has been applied to investigate consumers' initial acceptance of livestream e-commerce [7]. Although the initial user adoption is an important first step in the development of livestream e-commerce, many scholars have pointed out that it is

particularly important that the continued development and eventual success of information technology, such as the success of livestream e-commerce, rely on the frequent use instead of the first use of livestream e-commerce [3,8]. However, the studies involving the continued intention of livestream e-commerce users are few and far between. While the livestream e-commerce operators offer a number of advanced services to mobile subscribers, many experienced users are reluctant to keep using the livestream e-commerce for shopping, which slows down the growth of purchases from the livestream platforms. For livestream e-commerce operators, acquiring new customers and promoting their purchases from livestream e-commerce mark only the first step; they also need to retain these existing users and increase their purchasing activities [9].

Studies have proven that the cost of acquiring new users is five times higher than maintaining existing users [10]. Livestream e-commerce operators invest a lot of resources and effort in obtaining mobile users, but if the users do not consistently use livestream e-commerce, they cannot recover their costs, not to mention become profitability [11]. In addition, many livestream e-commerce operators rely heavily on discounts to maintain subscribers, which is an issue that needs to be addressed [7,12]. At the same time, increasingly emerging technologies cut into the livestream e-commerce scene, forming a high traffic, low-cost, high-conversion e-commerce model with few switching barriers between different livestream e-commerce operators. As a result, livestream e-commerce operators face a huge challenge to increase customer retention. Clearly, in the face of the huge market opportunity for livestream e-commerce, it has become imperative to drive sustained consumer behavior and thus expand market share. According to behavioral theory, “continuance intention is a necessary condition for the occurrence of behavior, if users do not have continuance intention, it is difficult to have the occurrence of continuous use behavior” [13]. Therefore, it is important to study the influencing factors and mechanisms of continuance intention of livestream e-commerce users. The deeper mechanisms of influence are yet to be explored.

Although the current research has achieved a series of valuable results, there are still shortcomings in existing literature on the drivers of continuance intention of livestream e-commerce. First, the previous literature focuses on the direct influence of Technology Acceptance Model on continuance intention, but lacks the comprehensive study on the mechanism of relationship bond, which has become a strategic issue that affects the development of livestream e-commerce, and the overall analysis of the relationship bond factors can help to comprehend the mechanism of continuous use of livestream e-commerce. Second, previous studies have mostly taken enterprises in developed western countries as samples, but research on the drivers of live e-commerce in developing countries remains scarce. Obviously, the relationship between user’s relational bonds and continuance intention is under studied in present livestream e-commerce scenario, and the moderation mechanisms by which user’s relational bonds influence their continuous use remain to be explored, which may lead to a lack of clarity in the mechanism for generating sustained intention. Based on the above analysis, this study proposes a new model as the theoretical basis, taking the mass users of Facebook livestreaming as research objects and using Structural Equation Modeling (SEM) to explore the mechanism of user’s relational bonds on the relationship of continuous use. Ultimately, it is hoped that this study will provide a useful reference for livestream e-commerce practices and provide a comprehensive, in-depth, and detailed understanding of consumers’ real hidden needs (i.e., differentiated needs) in order to facilitate the promotion of livestream e-commerce and the development of great market synergy.

## 2. Theoretical Review and Hypotheses Development

### 2.1. Theoretical Review

Relational bonds were first introduced in the field of relationship marketing research by Berry & Parasuraman (1991) [14], who first introduced the concept of relational bonds as a way for companies to cultivate and develop relationships with customers through various activity coupons to reduce customer churn, cultivate loyalty, expand market share, and

gain sustainable competitive advantage [4,15]. According to relationship marketing theory, companies can develop three types of relationship bonds with customers, namely financial bonds, social bonds and structural bonds, which form a hierarchical model based on their contribution to sustainable competitive advantage [16,17]. Financial bonds enhance user relationships through differentiated pricing policies and other financial instruments [4,18]. Researchers believe that one motivation for customers to engage in relationship exchange is to save money [19,20]. Typical financial bonds include airlines' "frequent flyer" programs (bonds through points for miles that expect customers to continue to fly with the airline) and e-tailers' points. Financial bonds are considered to have the lowest potential for sustained competitive advantage for firms because they lack the competitive edge [4].

Social bonds reflect the long-term relationships that companies build with their customers through friendship and emotional bonds taken [21]. The development of social bonds usually requires regular communication with customers, maintaining contact with them, responding positively to their needs in interaction, and showing them understanding, recognition and help [4,22]. E-retailers establish social bonds with customers either by recognizing their email personalization by name or by two-way communication [23]. Social bonds can drive customer loyalty when competitive differences are not strong, and social bonds motivate customers to be more tolerant of a firm's failure in service or to give firms the opportunity to respond to competitors' challenges [4].

Structural bonds are the ways in which firms enhance their relationships with users by providing additional services that are not otherwise available or are very costly to obtain [4,16,21]. Typically, these services are embedded in the delivery system of a product or service with technology as the core element [4]. Structural bonds focus on providing structural solutions to customers' problems and help them become more efficient in obtaining products or services [4,24]. More importantly, companies can leverage the practice of offering customized services (to meet the needs of users with differentiated interests and personal bonds) to gain structured connections (collaborating with business partners to provide services that are often scarce for users) [25,26]. Structural bonds help create a sustainable, differentiated competitive advantage for companies, with high levels of non-substitutability, and are therefore at the highest level of relational bonds [4,27].

As market competition increases, firms are encouraged to build long-term stable relationships with customers through relational bonds to maintain their market position. Relational bonds have been studied with applications in various industries. For this reason, scholars have realized the importance of exploring how these three types of relational bonds affect the quality of customer relationships and have initiated a series of discussions [16]. Although much research of relational bonds has been made, there are still limitations in the extant literature, for example, the studies have been conducted mainly in traditional contexts and less in online scenarios [21,22], and even less in livestream e-commerce contexts. In fact, relational bonds should be well studied in different scenarios, especially in livestream e-commerce scenarios. Therefore, this study applies relational bonds to livestream e-commerce scenario to explore the mechanisms of the specific dimensions of relational bonds (i.e., financial bonds, social bonds and structural bonds) on user's continuance intention.

## 2.2. Hypotheses Development

### 2.2.1. Financial Bonds and Cumulative Satisfaction

Financial bonds reflect the level of economic benefits generated by the exchange parties in the exchange relationship and they are a measure of the overall costs and rewards to the users of maintaining the relationship with the existing firm. Financial bonds can enhance the relationship with the users through, for example, special price concessions or other financial incentives for user loyalty [4,18]. Existing research suggests that one of the motivations for customers to engage in transactions is to spend less [20].

One study found that 53% of Internet users would buy more from a merchant if he or she offered a cumulative point service for goods or services; 47% would regularly review a

particular e-retailer if they received reward points or other loyalty rewards [23]. Satisfaction is reflected in the user's good feelings about the overall service experience. Companies can influence user satisfaction by offering price and quantity discounts. Research has found that financial bonds can enhance user satisfaction. In studying the relationship between relational bonds and online shopping user satisfaction, Chen & Chiu (2009) showed empirical results that financial bonds positively affect user satisfaction [28]; Chiu and Huang (2015) applied relationship marketing theory to study the relationship between retail banks and users, also found that financial bonds had a significant effect on satisfaction. Based on these studies, it can be reasoned that in the livestream e-commerce environment, livestream e-commerce anchors provide financial incentives to users, who can obtain the same goods or services at a lower price. As a result, the user compares the benefits with the costs and can get super value by using the services provided by this livestream e-commerce, which in turn enhances user satisfaction [25]. Although there is no literature that explicitly states or empirically demonstrates the relationship between financial bonds and cumulative satisfaction in the livestream e-commerce scenario, the relationship between transaction-specific satisfaction and cumulative satisfaction leads to the conclusion that financial bonds can have an effect on cumulative satisfaction by influencing transaction-specific satisfaction. Moreover, the discounts or offers offered by livestream e-commerce are not one-time, but ongoing, i.e., ongoing financial bonds can contribute to cumulative satisfaction. Therefore, it is reasonable to infer that financial bonds constructed by livestream e-commerce for users are positively correlated with cumulative satisfaction.

Thus, we derive the following hypothesis:

**Hypothesis 1 (H1).** *User's financial bonds are positively related to cumulative satisfaction.*

#### 2.2.2. Social Bonds and Cumulative Satisfaction

Social bonds are the non-financial satisfaction that users derive from a transactional relationship. Social bonds are essential for ongoing social exchange and reflect the level of social relations between the parties to a transaction [21]. Companies can generate social relationships by offering advice to consumers, expressing friendliness, understanding, and helpfulness in a way that responds positively to customer issues [21]. E-retailers may build social relationships with individual customers through personalized email names or two-way communication [23], social bonds can also be built through customer-to-customer interactions and friendships [26]. For example, "Buy Together" has created a virtual community, Pin Xiaoquan, on its own company website, where users can share information in a community to enhance social bonds. These social bonds make customers inclined to self-expression, listening and caring, and help increase mutual understanding, openness and intimacy between relationship partners, which are the main signs of intimacy or quality relationships. Previous studies have shown that social bonds contribute to customer satisfaction, such as, showing focus on user's needs and performance in response to user's problems [29]. In the livestream e-commerce scenario, the short video application interface is an important channel for operators to interact with customers. Special links are prominently placed in the livestream e-commerce interface to display unique goods or services; there are some buttons that may also appear on the APP interface for customers to click so that they can request support from the merchant in case they encounter problems or difficulties. These active bonds create a warm and shared situational atmosphere between the users and livestream e-commerce, thus increasing user satisfaction and, in the process, continually increasing the user's cumulative satisfaction.

Thus, the following hypothesis is obtained:

**Hypothesis 2 (H2).** *User's social bonds are positively related to cumulative satisfaction.*

### 2.2.3. Structural Bonds and Cumulative Satisfaction

Structural bonds involve features such as relationship structure, management, and institutionalization with users that can provide value-added services that are not readily accessible or costly to users elsewhere [28]. Structural bonds can be constructed by providing customized services to meet specific individual differentiated preferences, and by providing comprehensive services through collaboration with relevant stakeholders [25,26]; building a structured bond is usually not possible without customer investment, such as, time, effort, and personal data input [21]. Because of the high switching costs, structured bonds are often difficult to terminate [22]. For example, Amazon establishes structural bonds with customers through customized ordering and collaborative filtering techniques. Amazon customers switching to another website need to re-enter their information and lose access to personalized recommendations from Amazon. Hsieh et al. (2005) argued that structural bonds had different effects on user satisfaction, and that sharing expertise and information would reduce the risks associated with information asymmetry and help users enhance their understanding of the goods or services, thus making them more likely to use the goods or services and ultimately achieving the result of influencing user satisfaction [21].

Related empirical studies also confirm that structural bonds can significantly affect satisfaction. In Chen & Chiu (2009) [28], they found that structural bonds positively influenced user satisfaction and were more important for the long-term development of the firm than for the short-term. The findings from Lee et al. (2015) [30] showed that structural bonds had an impact on satisfaction through utilitarian benefits. In the livestream e-commerce scenario, some operators provide various tools on the short video application interface to allow customers to design the interface according to their differentiated preferences. Providing such services can reduce customer information load, improve customer experience of livestream e-commerce, and enhance customer satisfaction [31,32]. In addition, livestream e-commerce operators have allied with other merchants to provide value-added products to users in order to strengthen the relationship with them and improve their satisfaction with the APP. For example, Jingdong has partnered with Tencent to provide convenient WeChat payment. Previous research has shown which value-added services can stimulate a positive emotional response from users, thereby increasing their satisfaction [33]. Thus, it can be seen that structure bonds, in the process of providing customized and differentiated services to customers, inherently implies the purpose of long-term accumulation as well as achieving long-term interaction between firms and users. Obviously, structure bonds have a positive impact effect on cumulative satisfaction.

Therefore, we propose the following hypothesis:

**Hypothesis 3 (H3).** *User's structural bonds are positively related to cumulative satisfaction.*

### 2.2.4. Cumulative Satisfaction and Continuance Intention

User satisfaction plays an important role in relationship marketing and is a core research area in relationship marketing because it is a good predictor of user's subsequent behavior or continuance intention [34]. Many empirical studies confirm that user satisfaction significantly and positively influences user continuance intention [35,36]. In other words, satisfied users tend to repurchase the same products and services compared to dissatisfied users. In the field related to livestream e-commerce, studies have shown that user satisfaction has a positive effect on user's intention to continue using [37–39]. In addition to the above evidence on the positive relationship between transaction-specific satisfaction and sustained intention, other studies have considered the dynamics of user satisfaction and have attempted to examine the impact of cumulative satisfaction on user behavior. For example, Anderson & Sullivan (1993) found that firms that consistently provide high satisfaction over long periods are less sensitive to changes in satisfaction, and more specifically, for those firms that consistently provide high satisfaction, user's willingness to repurchase is less likely to be influenced by current dissatisfaction [40].

Bolton & Lemon (1999) developed a dynamic model of customer usage of services and found that user's cumulative satisfaction in the current period was a good predictor

of usage in future periods [41]. Jones & Suh (2000) found that cumulative satisfaction and specific satisfaction were positively correlated with repurchase intention, and confirmed that cumulative satisfaction was a better predictor of user's repurchase intention than transaction-specific satisfaction [42]. Keiningham et al. (2014) [43] found in their study of user's future spending money allocation that cumulative satisfaction is a weighted average of satisfaction with a particular transaction, and that recent transaction-specific satisfaction has a greater impact on the customer's next share of wallet (SOW) purchase of goods or services (i.e., on repurchase intention). Cumulative transaction satisfaction also positively affects the customer's money allocation for the next purchase (i.e., it affects the willingness to repurchase). At the same time, cumulative satisfaction has a more important effect on the customer's money allocation for the next purchase of goods or services than transaction-specific satisfaction.

As such, we derive the following hypothesis:

**Hypothesis 4 (H4).** *User's cumulative satisfaction is positively related to continuance intention.*

#### 2.2.5. Moderating Role of Affective Commitment

Affective commitment contributes to the emotional disposition to maintain ongoing valued relationships and is an essential element of long-term relationship success. It develops on the basis of personal devotion, that is, the desire of individuals to maintain a relationship that is geared toward long-term mutual benefit [7,44]. The underlying principle of affective commitment is the belief that affective commitment reflects a person's sense of involvement and belonging in the relationship in question. Therefore, it encourages the individual to continue the relationship due to the favourable attitudes, influences, emotions, and perceptions held about the individual's experiences in the relationship. Affective commitment has been considered to be the most important influence of commitment in predicting persistence intention [45]. It has been shown that affective commitment is an important predictor of continuance intention in online services [46]. Zhou et al. (2012) have investigated the relationship between cultural values, perceived value, affective commitment, and continuance intention in a virtual socialized world and finding that self-indulgence attenuates the effect of utilitarian values and enhances the effect of hedonic values on affective commitment; individualism reduces the effect of relational assets on affective commitment, while weakening the effect of affective commitment on continuance intention.

The literature has supported that satisfaction, trust, and commitment are main sub-structures of relationship quality and that which can build a good relationship only when the user is satisfied and emotionally committed to the operator [47]. Studies have shown that satisfaction positively influences affective commitment in both offline and online commerce relationships [44,46]. In the livestream e-commerce scenario, satisfaction helps to enhance user's willingness to maintain a transactional relationship with the APP operator, but due to the uncertainty and risk in the livestream e-commerce environment, which leads to the limitation of the role of user satisfaction in predicting user's continuance intention, while having users with higher levels of affective commitment are more likely to reinforce the advantages of livestream e-commerce, weaken the risks in using livestream e-commerce, and enhance the role of cumulative satisfaction in positively influencing continuance intention. Based on the consistency of previous studies in the literature, we expect that affective commitment moderates the relationship between cumulative satisfaction and continuance intention.

On the basis of the preceding arguments, we expect the following:

**Hypothesis 5 (H5).** *User's affective commitment plays a positively moderating role between user's cumulative satisfaction and continuance intention.*

In summary, we propose the theoretical model shown in Figure 1, which aims to investigate the influence of user relationship bonds on continuance intention in livestream e-commerce scenario.

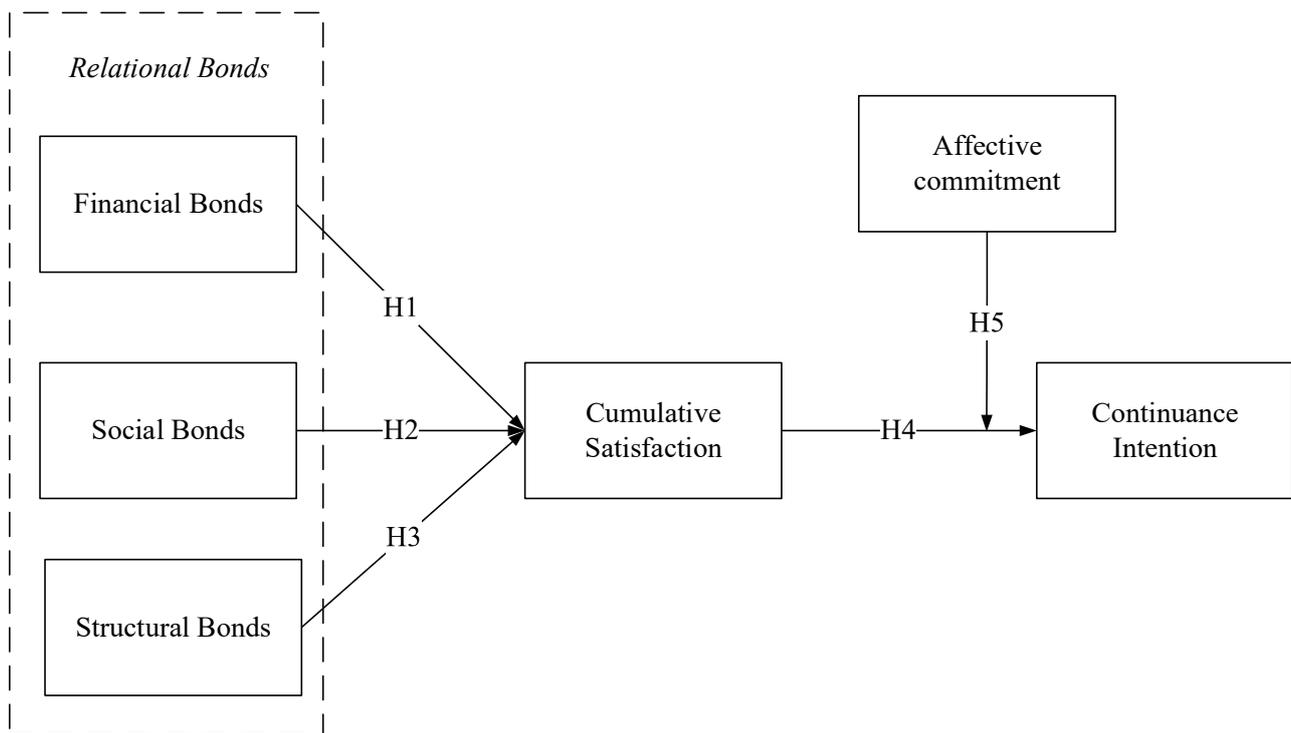


Figure 1. Theoretical model.

### 3. Research Method

#### 3.1. Measures

In this study, the measurement scales are all based on existing established scales, which are compiled through literature analyses according to the purpose of the study. To ensure the reliability and validity of the measurement items, this study uses back translation method to translate and validate established scales from previous academic studies. In addition, to ensure the expert validity of the measurement questionnaire, this study invites three scholars in the field of livestream e-commerce research and three corporate executives to review the questionnaire, which has been finally constructed through the joint suggestions from the academic and practical communities. The variables are measured as follows.

First, a 11-item scale, were adopted to measure three dimensions of relational bonds. The details are as follows, a 3-item scale, proposed by Lee et al. (2015) [30] and Lin et al. (2003) [17], were adopted to measure financial bonds; a 4-item scale, proposed by Lee et al. (2015) [30] and Hsieh et al. (2005) [21], were adopted to measure social bonds; a 4-item scale, proposed by Hsieh et al. (2005) [21] and Lin et al. (2003) [17], were adopted to measure structural bonds. All measurement question items are modified according to the actual situation of livestream e-commerce. Second, cumulative satisfaction scales were primarily based on the literature related to Zhao et al. (2012) [48] and was modified into a cumulative satisfaction measurement question based on the actual usage context of livestream e-commerce. The scale has four question items. Third, continuance intention scale in this study was based on Bhattachajee (2001) [11] and Thong et al. (2006) [49], and was modified to become a measure of continuance intention based on the actual context of livestream e-commerce, with contains four questions. Fourth, to measure affective commitment, this study used four items proposed by Zhou et al. (2015) [45] and is modified into an affective commitment measurement question based on the actual usage context of livestream e-commerce. This scale is rated on a 7-point response scale ranging from 1 (strongly disagree) to 7 (strongly agree).

### 3.2. Sample and Data Collection

The data collection of this study takes the full representativeness of the sample into consideration. So, Facebook Live is selected because it is the most popular livestream platform in Taiwan. Online questionnaires (see Appendix A) were distributed through multiple channels such as Facebook post and Line message because they are the top two livestream e-commerce that Taiwanese use most. Respondents must have livestream e-commerce purchase experience in the past six months. This study uses a feasibility sampling method to collect data, and the subjects are users of Facebook Live in Taiwan. In addition to the questionnaire in paper, users can access the questionnaire mainly through hyperlinks. Before answering the questionnaire, they are instructed to read an information sheet telling subjects to participate in the questionnaire on a voluntary and anonymous basis, and only users who had used Facebook Live to make purchases in the past six months are eligible to participate in the questionnaire. To ensure that respondents are the target audience for this study, two filtering questions are used at the beginning of the survey to determine user eligibility (i.e., exclusion of those under 18 years of age and no livestream e-commerce purchases in the past six months). This study was conducted from 12 July 2021 to 15 October 2021, through multiple sources (including paper questionnaires, emails, and Questionnaire Star APP); a total of 600 users participated in the questionnaire; 5.83% of users ( $n = 35$ ) did not answer the trap questions correctly and were therefore excluded from the analysis, and then the questionnaires answered by 565 qualified users were further processed. The number of valid samples was 546 after excluding invalid questionnaires.

As shown in the descriptive statistical analysis of the sample in Table 1, there are relatively more female than male users of the community group buying platform, accounting for 55.86%. In terms of age distribution, the largest number of users are aged 21–30 (inclusive), accounting for 33.88%; followed by users aged 31–40, accounting for 33.15%; followed by the two age groups below 20 (inclusive) and 41–50, accounting for 1.17% and 15.94% respectively; while only 5.86% of users are aged 51 (inclusive) or above. In terms of marital status, there are far more unmarried users than married ones, accounting for 57.88%; in terms of occupation, corporate employees account for the highest proportion, with 37.73%. In terms of education, users with bachelor's degree account for the most (35.35%); in terms of average monthly consumption, the largest number of users spends NT 10,000 to NT 20,000 per month (30.40%), and the smallest number of users spends NT 30,001 or more (18.13%). In terms of continuous usage time, most users belong to the group within 6 months (32.97%), followed by users with 6 months to 1 year (inclusive) (27.84%), then users with 1 to 2 years (inclusive) (24.91%), and the least users with more than 3 years (14.28%).

### 3.3. Data Analysis Method

In this study, the collected data are analyzed by Structural Equation Modeling (SEM) using Mplus 7.0 programming software. Specifically, the data analysis process in this study is as follows. First, confirmatory factor analysis (CFA) is conducted to determine the convergent validity of each construct. Second, discriminant validity is performed to determine whether there is a difference between any two different dimensions. Third, the structural model is tested for goodness of fit, and the underlying assumptions are verified to be valid. Finally, a moderating role test is conducted to verify the hypotheses proposed in this study.

**Table 1.** Descriptive statistical analysis.

Variables	Item	Frequency	%	Cumulative %
Gender	male	241	44.14	44.14
	female	305	55.86	100
Age	20 years old (inclusive) or less	61	11.17	11.17
	21~30 years old (inclusive)	185	33.88	45.05
	31~40 years old(inclusive)	181	33.15	78.20
	41~50 years old(inclusive)	87	15.94	94.14
	51 years old (inclusive) or above	32	5.86	100
Marriage	Married	230	42.12	42.12
	Unmarried	316	57.88	100
Profession	Civil Servants	142	26.01	26.01
	Employees of enterprises	206	37.73	63.74
	Students	62	11.36	75.10
	Other	136	24.90	100
Education level	High school and below	80	14.65	14.65
	Specialty	102	18.68	33.33
	Undergraduate	193	35.35	68.68
	Master's degree and above	171	31.32	100
Consumption level	Below 10,000 NT	121	21.98	21.98
	10,000~20,000 NT	166	30.40	52.38
	20,001~30,000 NT	161	29.49	81.87
	30,001 NT or more	98	18.13	100
Continuous use time	6 months and blow	180	32.97	32.97
	6 months to 1 year (inclusive)	152	27.84	60.81
	1~2 years (inclusive)	136	24.91	85.72
	Over 3 years	78	14.28	100

## 4. Analyses and Results

### 4.1. Confirmatory Factor Analysis

This study evaluates and revises the measurement model of CFA according to the approach of Anderson and Gerbing (1988) [50]. That is, CFA should report Standardized Factor Loading, Multivariate Correlation Squared, Composite Reliability, and Average Variance Extracted for all variables, and only after these metrics pass the test, structural model evaluation can be performed [51]. Hair, Anderson, Tatham & Black (1998), Nunnally & Bernstein (1994), Fornell & Larcker (1981) [52–54] clearly stated that when Standardized Factor Loading (SFL) was greater than 0.50, Composite Reliability (CR) was greater than 0.60, and Average Variance Extracted) was greater than 0.50, then the measurement model had good convergent validity.

As shown in Table 2, the indicators of interest for CFA are reported in Table 2. In this study, standardized factor loadings of all dimensions are between 0.521 and 0.926, and the composite reliability is between 0.803 and 0.868. Convergence Validity is between 0.506 and 0.648. Thus, the results of Standardized Factor Loading, Composite Reliability and Average Variance Extracted meet the criteria of Hair et al. (1998), Nunnally & Bernstein (1994), Fornell & Larcker (1981) [52–54]. Therefore, the results of CFA analysis indicate good convergent validity for all the constructs.

**Table 2.** Confirmatory factor analysis.

Construct	Item	Unstd. Factor Loading	S.E.	Z-Value	SFT	CR	AVE
Financial bonds (FIB)	FIB1	1.000			0.747	0.846	0.648
	FIB2	1.042	0.061	17.044	0.765		
	FIB3	1.241	0.071	17.500	0.895		
Social bonds (SOB)	SOB1	1.000			0.743	0.812	0.526
	SOB2	1.097	0.062	17.610	0.836		
	SOB3	0.916	0.059	15.461	0.763		
	SOB4	0.594	0.055	10.773	0.521		
Structural bonds (STB)	STB1	1.000			0.658	0.821	0.539
	STB2	0.824	0.068	12.073	0.601		
	STB3	1.356	0.090	15.069	0.805		
	STB4	1.327	0.092	14.481	0.844		
Cumulative satisfaction (CUS)	CUS1	1.000			0.586	0.814	0.530
	CUS2	0.963	0.084	11.488	0.606		
	CUS3	1.588	0.120	13.274	0.862		
	CUS4	1.525	0.116	13.136	0.816		
Continuance intention (CI)	CI1	1.000			0.644	0.868	0.629
	CI2	0.935	0.071	13.245	0.635		
	CI3	1.287	0.075	17.194	0.916		
	CI4	1.344	0.077	17.533	0.926		
Affective commitment (AC)	AC1	1.000			0.759	0.803	0.506
	AC2	0.966	0.056	17.189	0.775		
	AC3	1.058	0.141	7.513	0.697		
	AC4	0.911	0.138	6.585	0.602		

Note 1: STD, Standardized factor loadings; CR, Composite Reliability; AVE, Average Variance Extracted. Note 2: FIB, financial bonds; SOB, social bonds; STB, structural bonds; CUS, cumulative satisfaction; CI, continuance intention; AC, affective commitment.

#### 4.2. Discriminant Validity

The interrelationships between the two constructs in this study are shown in Table 3 for discriminant validity, which is an analysis used to test whether any two variables in the theoretical model are identical to each other. If there is no identity between any two variables, then the measurement model has good discriminant validity. This study uses the latest discriminant validity analysis method, namely confidence interval method [55] to confirm the confidence interval of the correlation coefficient between variables. If it fails to include “1”, then it is completely correlated, indicating that the facets have different validity. As Hancock and Nevitt (1999) [56] suggested, bootstrap test is conducted in this study. 95% confidence interval of the correlation coefficient does not involve 1 (see Table 3 below), which shows the good discriminant validity between all the variables. Therefore, the measurement model has good discriminative validity.

#### 4.3. Model Fit Degree

Bollen and Stine (1992) [57] proposed a bootstrap correction for the large SEM sample size, which resulted in a large cardinality value and therefore the  $p$ -value was easily rejected. 178.7 for the Bollen-Stine  $p$ -correction and 599.859 for the original cardinality value. The calculation results are shown in Table 4. The study by Jackson et al. (2009) stated that structural models should report model fit metrics as a way to assess, correct, and judge the goodness of measurement models [57]. As suggested by Jackson et al. (2009) [58],  $ML\chi^2$ , DF, Normed Chi-sqr ( $\chi^2/DF$ ), RMSEA, SRMR, TLI (NNFI), CFI, GFI, and AGFI were the common metrics used to test the fit of research models. Therefore, academics usually use these nine metrics to test whether the model fit is good or not. In principle, the lower  $\chi^2$  is

better, but since  $\chi^2$  is very sensitive to the sample size, it is evaluated with the assistance of  $\chi^2/df$ , whose ideal value should be less than 3. The judgment criteria of all indicators are shown in Table 4. In this study, Mplus 7.0 is applied to analyze the model fit. The results of model fitness are shown in Table 3 and all of them meet the suggested criteria of Jackson et al. (2009) [58]. Therefore, the structural model has a good fit in this study.

**Table 3.** Discriminant validity.

Parameter	Estimate	Bias-Corrected 95%		Percentile 95%	
		Lower	Upper	Lower	Upper
FIB<->SOB	0.299	0.192	0.408	0.192	0.406
FIB<->STB	0.351	0.236	0.451	0.239	0.452
FIB<->CS	0.289	0.175	0.406	0.175	0.404
FIB<->CI	0.180	0.088	0.276	0.087	0.274
FIB<->AC	0.266	0.170	0.367	0.170	0.368
SOB<->STB	0.583	0.493	0.663	0.494	0.664
SOB<->CS	0.482	0.363	0.573	0.374	0.577
SOB<->CI	0.269	0.176	0.368	0.176	0.368
SOB<->AC	0.375	0.270	0.474	0.261	0.467
STB<->CS	0.591	0.509	0.674	0.510	0.674
STB<->CI	0.336	0.246	0.428	0.245	0.426
STB<->AC	0.587	0.496	0.677	0.489	0.671
CS<->CI	0.551	0.454	0.651	0.455	0.652
CS<->AC	0.608	0.521	0.701	0.520	0.693
CI<->AC	0.390	0.292	0.490	0.286	0.487

**Table 4.** Model fit criteria and the test results.

Model Fit	Criteria	Model Fit	Result
Normed Chi-square( $\chi^2/DF$ )	<3	1.232	pass
RMSEA	<0.08	0.021	pass
SRMR	<0.08	0.072	pass
TLI (NNFI)	>0.9	0.992	pass
CFI	>0.9	0.993	pass
GFI	>0.9	0.966	pass
AGFI	>0.9	0.951	pass

#### 4.4. Regression Coefficient

The regression coefficients are reported in Table 5. In this study, the path coefficient relationships of the measurement models are shown in Table 5. In detail, financial bonds (FIB) ( $b = 0.051$ ,  $p = 0.108$ ), does not significantly affect the cumulative satisfaction (CUS). Therefore, Hypothesis 1 (H1) is not established. Social bonds (SOB) ( $b = 0.134$ ,  $p < 0.001$ ) and structural bonds (STB) ( $b = 0.351$ ,  $p < 0.001$ ) significantly affect the cumulative satisfaction (CUS). Therefore, Hypothesis 2 (H2) and Hypothesis 3 (H3) are established. Cumulative satisfaction (CUS) ( $b = 0.551$ ,  $p < 0.001$ ) significantly affected continuance intention (CI). Therefore, Hypothesis 4 (H4) is established.

**Table 5.** Regression coefficient.

Hypotheses	Unstd.	S.E.	Unstd./S.E.	Std.	$p$
Hypothesis 1	0.051	0.031	1.608	0.074	0.108
Hypothesis 2	0.134	0.041	3.272	0.198	***
Hypothesis 3	0.351	0.053	6.600	0.447	***
Hypothesis 4	0.551	0.061	9.043	0.550	***

Note. \*\*\*  $p < 0.001$ .

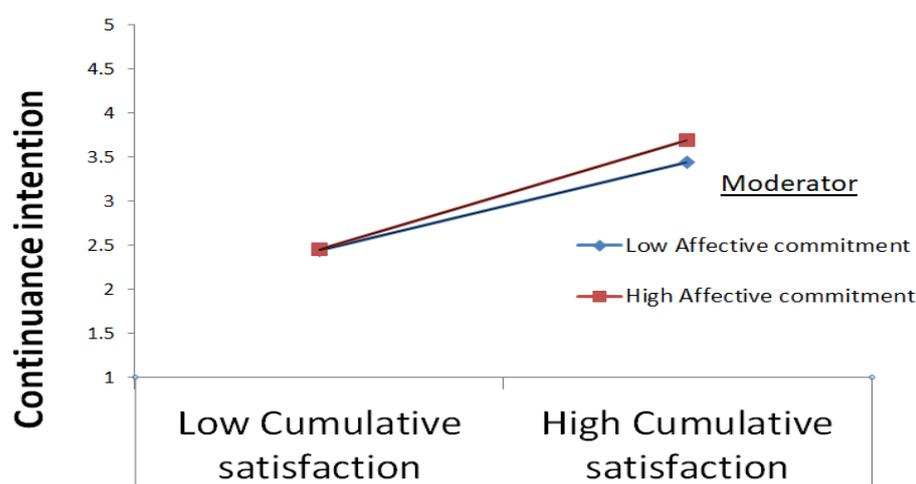
#### 4.5. Moderating Effects Analysis

The moderating effects are reported in Table 6. In the present study, affective commitment (AC) is the moderating variable. The results of structural equation modeling have been shown that the moderating effect of cumulative satisfaction (CS)  $\times$  affective commitment (AC) on continuance intention (CI) is 0.061 ( $z = |2.326| > 1.96$ ,  $p = 0.020 < 0.05$ ), implying the presence of a positive moderating effect of affective commitment (AC) on the relationship between cumulative satisfaction (CS) and continuance intention (CI). Specifically, the slope of cumulative satisfaction (CS) on continuance intention (CI) increases positively by 0.061 units for each 1-unit increase in the moderating variable affective commitment (AC). That is, affective commitment (AC) has a positive moderating effect. The result is shown in Figure 2. Therefore, Hypothesis 5 (H5) is verified.

**Table 6.** The analysis of moderating effect.

DV	IV	Estimate	S.E.	Z-Value	<i>p</i>
Continuance intention	Cumulative satisfaction	0.557	0.075	7.415	***
	Affective commitment	0.064	0.044	1.460	0.144
	Cumulative satisfaction $\times$ Affective commitment	0.061	0.026	2.326	0.020

Note. \*\*\*  $p < 0.001$ .



**Figure 2.** Privacy concern moderating the relationship between social attachment and information value.

## 5. Research Results and Discussion

### 5.1. Conclusions and Discussion

First, the relationship between financial bonds and cumulative satisfaction is examined. Mplus 7.0 is applied to analyze the collected data by structural equation modeling, and the results show that the  $p$ -value of the effect of financial bonds on cumulative satisfaction is greater than 0.05, which indicates that the effect of financial bonds on cumulative satisfaction is not significant. In other words, it is confirmed that Hypothesis 1 (H1) is not valid. The possible reasons for the inference are mainly twofold. On the one hand, financial bonds may be the result of user's tendency to short-term transactions rather than long-term relationship maintenance, and cumulative satisfaction is the result of long-term relationship construction. On the other hand, with the increase of competition in the market, financial and other monetary material stimuli can reduce the cost of user transactions and make users get more products or services for the same amount of money spent and thus feel satisfied, but for cumulative satisfaction financial stimuli are health care factors rather than incentives and thus cannot make users cumulative satisfaction increase significantly.

Second, the relationship between social bonds and cumulative satisfaction is examined. From the result of correlation analysis, there is a significant positive correlation between

social bonds and cumulative satisfaction, indicating that social bonds have significant impact on cumulative satisfaction. The relationship between social bonds and cumulative satisfaction is clear through structural equation analysis. As the overall model test and path analysis show that the  $p$ -value of social bonds on cumulative satisfaction is less than 0.001, indicating that the strength of social bonds affects the strength of cumulative satisfaction, confirming that Hypothesis 2 (H2) holds, which echoes the previous study that relative bonds positively affect online user's satisfaction [28]. In contrast to the traditional e-commerce environment, the virtual communication between the users and providers of livestream e-commerce service is mainly carried out through mobile devices such as cell phones, so the intimate social communication links become the key to user's satisfaction. Operators make users feel respected by frequent interaction with them and giving them friendly names, paying attention to their immediate needs, building interactive bonds for users to communicate and share their livestream e-commerce experience, etc., and being respected makes users feel satisfied, and cumulative satisfaction is the result of long-term usage. As a result, when users use a livestream e-commerce for a long time, they will have a clear understanding and recognition of the social bonds provided by the APP operators, and are more likely to establish a close relationship with the operators. Therefore, social bonds have a great impact on cumulative satisfaction.

Third, the relationship between structural bonds and cumulative satisfaction is examined. From the correlation analysis between structural bonds and cumulative satisfaction, structural bonds are significantly positively correlated with cumulative satisfaction, indicating that structural bonds and cumulative satisfaction are strongly associated, and Hypothesis 5 (H5) is confirmed, which is consistent with previous studies that structural bonds positively affect online user's satisfaction [28]. Structural bonds are mainly constructed by wanting to provide value-added services to users that are not easily available or costly at competitors. For example, structural bonds meet user's individual needs by offering customized services and by providing integrated services with the ecosystem, etc. The findings of Lee et al. (2015) [30] showed that structural bonds influenced satisfaction through utilitarian benefits. Livestream e-commerce operators provide value-added services such as convenient payment, various settlement methods, and fast logistics to users through partners in the ecosystem or their own construction to enhance satisfaction. Previous related studies have confirmed that value-added services can elicit positive emotional responses from users and enhance user satisfaction. In addition, the construction of structural bonds often requires customers to invest time and energy to fully understand the value-added services of service providers and to choose the corresponding services according to their needs to enhance satisfaction. Structural bonds have a significant impact on cumulative satisfaction, which may be that cumulative satisfaction is the comprehensive and long-term satisfaction of needs, and the main idea of structure bonds is based on providing customized and differentiated services to customers, achieving long-term interaction with users and satisfying their comprehensive needs.

Fourth, the relationship between cumulative satisfaction and continuity intention is validated. From the correlation analysis of cumulative satisfaction and continuance intention, the significant positive correlation between cumulative satisfaction and continuance intention indicates that there is a strong relationship between cumulative satisfaction and continuance intention, so the structural equation analysis is used to study the relationship between the two as a whole, which makes Hypothesis 4 (H4) confirmed.

The relationship between cumulative satisfaction and continuance intention has been extensively confirmed in previous studies. Bharadwaj (2022) [6] confirmed that satisfaction had a greater impact on user's continued use of B2C services compared to perceived usefulness and loyalty stimuli; in mobile commerce-related areas, studies have confirmed that satisfaction is a key factor influencing users. In the mobile commerce-related field, studies have confirmed that satisfaction is a key factor influencing user's intention to continue using mobile commerce [37–39]. Cumulative satisfaction is a better predictor of user's continuance intention probably because cumulative satisfaction is the result of user's

long time participation, and this satisfaction result is stable and less likely to be affected by current dissatisfaction, and easily influenced by the livestream e-commerce environment and user's own emotions at that time, which is more variable, which can explain that some users are dissatisfied with a transaction, but still transact with that merchant next time. The study confirmed that cumulative satisfaction is positively related to repurchase intention and that cumulative satisfaction can better predict user's repurchase intention [23].

Fifth, the moderating effect of affective commitment is verified. According to the results of the moderating effect analysis, it can be seen that affective commitment has a positive moderating effect between cumulative satisfaction and continuance intention, where the moderating effect of affective commitment between cumulative satisfaction and continuance intention. The moderating effect of affective commitment on the relationship between cumulative satisfaction and continuance intention is significant, that is, there is a significant difference between users with different levels of affective commitment on the relationship between cumulative satisfaction and continuance intention. Users with higher affective commitment tend to have emotional attachments based on long-time interactions with livestream e-commerce operators, and users with higher affective commitment tend to trust service providers more, to find the advantages of a livestream e-commerce more easily, and to tolerate some inappropriate transactions with livestream e-commerce operators. The effect of their cumulative satisfaction on continuance intention is therefore enhanced. On the contrary, users with low affective commitment lack trust in the livestream e-commerce service providers, and are less active in interacting with the livestream e-commerce service providers. Therefore, even users with high cumulative satisfaction are less likely to continue using a livestream e-commerce service than those with higher levels of affective commitment. As elaborated above, affective commitment is based on the overall, comprehensive transaction outcome that is valued during the long-term interactive communication journey with the operators and may ignore certain specific transaction outcomes, thus affective commitment has a significant moderating effect between cumulative satisfaction and continuance intention.

## 5.2. Theoretical Contributions

On the one hand, the mechanism is revealed of action of continuance intention relationship between users and livestream e-commerce based on new perspectives. The current academic research on livestream e-commerce is mainly focused on initial adoption and acceptance behaviors, and relatively little research has been conducted on user's continuance intention. From the existing studies on continuance intention, it can be found that most of the studies are based on the expectation confirmation model (ECT-IT) information system success model (IS success model). These research paradigms have received criticism from information systems scholars that these paradigms restrict our view to an extremely narrow scope and limit our knowledge of the factors influencing individual adoption and continuance of information systems [59]. Furthermore, the understanding of livestream e-commerce persistence focuses on factors that influence customer's antecedents and consequences, such as their habits, usage motivations and values. By contrast, customers lack understanding of the factors that affect livestream e-commerce operations. And these factors can provide more actionable recommendations for livestream e-commerce operators, and it is based on the operator's perspective that this study introduces relative bonds.

On the other hand, this study develops a theoretical model of the influence of relational bonds on continuance intention in livestream e-commerce contexts. The current empirical research on the factors influencing user continuance intention in livestream e-commerce scenarios is relatively limited, except for the study by Zhou et al. (2015), previous scholars have mainly explored the formation of user continuance intention phenomenon from a qualitative perspective. In order to make up for the shortcomings of previous empirical studies on users' continuance intention in the context of livestream e-commerce, this study used questionnaires to collect data from Facebook Live users and constructed structural equation models to analyze the data. This study verified the effect of different dimensions

of users' relational bonds on continuance intention in the context of livestream e-commerce usage through structural equation modeling. The study also found that the moderating effect of different levels of affective commitment on cumulative satisfaction on continuance intention differed among users. Therefore, the findings of this paper make up for the shortcomings of previous empirical studies on the influence of continuance intention and enrich the research related to explaining users' continuance intention from the perspective of relational bonds, which will provide a reference for future related studies.

### 5.3. Practical Implications

Firstly, the effect and role of cumulative satisfaction are highlighted. This study shows that cumulative satisfaction is positively influenced by social bonds and structural bonds and plays a significant role in relation to continuance intention, which indicates that cumulative satisfaction is a key predictor of users' continuance intention. Therefore, livestream e-commerce operators need to highlight the role of the cumulative satisfaction, continuously invest resources to improve user's cumulative satisfaction, and drive users to generate lasting satisfaction, thus enhancing continuance intention. This study finds that financial bonds, social bonds and structural bonds have a positive impact on cumulative satisfaction. Based on this, deepening financial bonds, social bonds and structural bonds is an effective way to improve cumulative satisfaction.

Secondly, the "health" role of financial incentives is focused on and maintained. Although financial bonds have less effect on cumulative satisfaction than social bonds and structural bonds, or even have no significant effect on cumulative satisfaction, financial bonds are more of a "health care factor". Therefore, without the stimulation of financial bonds, the satisfaction of users, especially the cumulative satisfaction, will be reduced, which reminds the livestream e-commerce operators of providing financial stimulation to arouse the desire of users to continue using. In order to create financial bonds, the livestream e-commerce operators need to provide financial incentives to their users. For example, the coupons are offered for an extended period. Nowadays, coupons are generally valid for 1 week or a few days, and when they are limited to holidays such as May Day and National Day. On the one hand, they will stimulate users to use them frequently within a short period of time, but at the same time, they will hurt the user's livestream e-commerce experience and make some of them regretful, based on which the valid period of coupons can be appropriately extended. Livestream e-commerce operators can also initiate promotional coupon, for example, developing new applications with VIP privileges that can be won in lotteries when users actively participate.

Thirdly, user satisfaction is enhanced by strengthening social bonds. To reinforce social bonds, it is necessary for livestream e-commerce operators to develop invitations to consumers to experience and then propose improvements based on consumer feedback on information experience, entertainment experience and interactive experience. Not only that, operators can offer virtual gifts and greeting messages to their users in order to draw closer bonds with consumers and inspire consumer satisfaction. They should also pay attention to the important role of information technology-based support in livestream e-commerce to efficiently, simply and quickly solve the problems associated with the use of such livestream e-commerce by consumers. Services like this make consumers feel valued and cared for, a feeling that can make them feel satisfied with their experience of using that livestream e-commerce. When a livestream e-commerce operator interacts with a user, the operator should address the user by their first name rather than using generic terms such as "Dear Customer" to show that they care about the user and build emotional intimacy with their users.

Fourthly, the structural bonds are enhanced and the conversion cost is constructed. In order to establish structured bonds with users, livestream e-commerce operators should improve their customization services. More specifically, they can leverage the analytics and mining capabilities of recommendation algorithms to filter user needs, thus accurately predicting the flow of information consumers receive; they can also partner with online

analytics and mining capabilities to boost the popularity and traffic of the live stream, thereby enhancing consumer purchase rates; they can also authorization authoritative consulting firms to create a free information access platform on that livestream e-commerce to provide users with information on current trends and fashions to increase the information value of that livestream e-commerce. When these initiatives are implemented, users will experience significant value-added benefits, building high barriers to conversion and increasing retention. Livestream e-commerce should also be aware of the significant differences in the role of financial bonds, social bonds and structured bonds in influencing customer satisfaction, which is a key driver of user continuance intention. Considering the strongest effect of structural bonds and the weakest effect of financial bonds, operators should create tighter relational bonds to increase market share, gain greater competitive advantage and provide a solid foundation for maintaining subscriber continuance intention.

#### *5.4. Research Limitations and Future Research Directions*

The data collected by the questionnaire method in this study provides authenticity and objectivity for empirical analyses, but they do not reflect the dynamic trends of livestream e-commerce user's psychology. Therefore, in future research, we can write an automated web crawler program to track the relationship bonds and continuance intention of users in the context of livestream e-commerce usage in real time, and obtain serial data for analyses using the panel model, and verify and examine the relationship between user's continuance intention in the context of livestream e-commerce usage.

On the other hand, this study mainly analyzed the data through structural equation modelling. The advantage of this data analysis method is that the findings are supported by empirical tests, thus improving the accuracy of the conclusions. However, since this data analysis method reflects static results, it cannot explain the moderated dynamic process of the ongoing relationship between users and live e-commerce [60]. Therefore, future research can adopt the experimental method to track the individual experiences and feelings of livestream e-commerce users and dynamically describe the moderation process of the development of user's psychological events, and further explore the inner mechanism of the influence mechanism of continuance intention of livestream e-commerce users.

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## Appendix A Scales

### Financial bonds

1. Livestream e-commerce (e.g., Facebook Live) offers vouchers, cashback, matching gifts, etc. to stimulate spending.
2. Livestream e-commerce (e.g., Facebook Live) Facebook Live offers points service.
3. I get discounts when I reach a certain threshold of purchase amount at livestream e-commerce (e.g., Facebook Live).

### Social bonds

1. Livestream e-commerce (e.g., Facebook Live) will stay in touch with me through tweets, spending, etc.
2. Livestream e-commerce (e.g., Facebook Live) will pay attention to my needs.
3. Livestream e-commerce (e.g., Facebook Live) builds interactive communities for users.
4. I can share my shopping experience on livestream e-commerce (e.g., Facebook Live).

### Structural bonds

1. Livestream e-commerce (e.g., Facebook Live) will provide comprehensive services such as convenient payment.
2. Livestream e-commerce (e.g., Facebook Live) often offers new and innovative products or services.
3. Livestream e-commerce (e.g., Facebook Live) will respond to my complaints about merchants in a timely manner
4. Livestream e-commerce (e.g., Facebook Live) offers a variety of transaction methods (such as installment payments).

### Cumulative satisfaction

1. Livestream e-commerce (e.g., Facebook Live) is one of the best shopping apps I've chosen.
2. I think I am wise to use livestream e-commerce (e.g., Facebook Live).
3. I had a good experience with livestream e-commerce (e.g., Facebook Live).
4. Livestream e-commerce (e.g., Facebook Live) always meets my shopping expectations.

### Continuance intention

1. I share the experience of using livestream e-commerce (e.g., Facebook Live) with my friends.
2. When I have the need, I use livestream e-commerce (e.g., Facebook Live).
3. In the future, I will continue to use livestream e-commerce (e.g., Facebook Live).
4. I use livestream e-commerce (e.g., Facebook Live) to communicate with friends and share information.

### Affective commitment

1. When I use livestream e-commerce (e.g., Facebook Live), I immerse myself unconsciously.
2. I have a deep affection for livestream e-commerce (e.g., Facebook Live).
3. Livestream e-commerce (e.g., Facebook Live) gives me a strong sense of belonging.
4. Livestream e-commerce (e.g., Facebook Live) is very attractive to me.

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