

Research on the Impact of Perceived Interaction on User Stickiness in the Context of Tiktok E-commerce Live Broadcast--The Mediating Role Based on Emotional Attachment

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Abstract. COVID-19 has been recurrent for the last three years, the competition in the e-commerce live broadcast market of 'more, faster, better and more economical' is becoming increasingly fierce. The Tiktok app as a typical e-commerce live broadcast platform that urgently needs to improve user stickiness to stabilize traffic. Based on the survey of users, this paper explores the influencing factors of user stickiness of e-commerce live broadcast platform according to CAC theory, and uses SPSS software to test the obtained data. Studies have shown that perceived interaction positively affects emotional attachment, and emotional attachment positively affects user stickiness, perceived interaction can be divided into user control, connectedness, responsiveness, and entertainment, emotional attachment can be divided into platform identity and platform affection. Based on the research conclusions, reasonable suggestions are put forward for e-commerce live broadcast platform.

1 Introduction

Since the outbreak of the COVID-19 epidemic in 2020, home isolation has become one of people's daily scenarios. How to meet people's diversified needs while trying to avoid traditional online shopping problems such as "the goods don't match the board" has become a hot spot, so e-commerce live broadcast has developed with the trend. With the continuous rise of e-commerce live broadcast platforms, the fierce battle for users has also begun.

At present, although the Tiktok platform continues to develop in the direction of realization of fan economy with the help of user traffic development dividends, Tiktok, as a product incubated by Toutiao, has a coincidence of 32.1% with Toutiao, coincident users accounted for 42.2% of Tiktok, and 24.6% with watermelon video. How to attract new users while retaining this part of the users, enhancing user stickiness to stabilize traffic has become the key. In this context, this paper explores the influencing factors affecting the user stickiness of Tiktok APP on e-commerce live broadcast platform based on CAC theory.

such as Newhagen et al. (1995) proposed that traditional interaction mainly refers to the activity relationship between individuals, and the ability to directly contact each other and feel the reaction of the other party^[1]. Floh (2013) expands the connotation of perceived interaction in the network environment, defining it as a state of mind experienced by users in the process of communicating with the interactive object^[2]. In the study of modern society, Zhang Mengxuan (2021) defines perceived interaction as the actual interaction experience that customers feel with the live broadcast platform and other relevant parties during the e-commerce live broadcast process^[3]. Academia often divides them into multiple dimensions such as behavior, functionality, and user control based on interactive relationships, interactive processes, and interactive elements. Based on the above research, this paper defines perceived interaction as a psychological experience in which consumers feel the platform interacting with them when watching a live webcast or video. It is divided into four dimensions: user control, entertainment, connectedness, and responsiveness. The dimensions are defined in Table 1.

2 Literature review

2.1 Perceived interaction

Academic research on perceived interaction is relatively rich, and there are many forms of definition of its meaning,

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Table 1. Definition of perceived interaction dimensions

Dimension	Definition
user control	The user's level of control and grasp over the menu function, information presentation, and browsing rhythm. ^[4]
entertainment	The level of joy that users feel in communicating with multiple parties. ^[4]
connectedness	The extent to which users share and communicate with each other on the platform. ^[5]
responsiveness	The extent to which social media is able to respond to user queries. That's to say, the system can quickly process the user's needs, so that the user can obtain the desired information in time. ^[6]

2.2 Emotional attachment

The concept of emotional attachment is derived from attachment theory, proposed by British psychoanalyst John Bowlby in the late 60s of the 20th century, and was originally used mainly to explain the natural strong emotions between infants and their mothers or fathers^[7], nowadays, Wang Liming et al. believe that attachment theory refers to the lasting emotional association that a person establishes with a specific individual or possession^[8]. With the continuous expansion of the scope of research, the re-

search objects of emotional attachment theory have gradually developed from interpersonal attachment to virtual space attachment and other fields, such as Ren et al. (2012) divided attachment into two aspects, identity-based attachment (group identity) and bond-based attachment (interpersonal relationship)^[9]. Wang Liming et al. divided emotional attachment into three dimensions: recognition, affection, and dependence^[8]. Based on the above research, this paper argues that emotional attachment is the user's identification and attachment to its content and functions in the process of browsing the e-commerce live broadcast platform, which can be divided into two dimensions: platform identity and platform affection. The dimensions are defined in Table 2.

Table 2. Definition of emotional attachment dimensions

Dimension	Definition
Platform Identity	After users obtain resources through the platform to meet their needs, they will credit the platform and have a sense of recognition for the platform. ^[10]
Platform Affection	The value provided by the platform can satisfy the user's needs or generate interest, which in turn will make the user love. ^[11]

2.3 User stickiness

Regarding the meaning of user stickiness, Judy Chuan-Chuan Lin believes that user stickiness is the ability of a website to attract and retain customers. Yan Huili et al. define user stickiness as the user's cognition and emotion of continuous use of the application, which is manifested in the continuous use of the application in the face of conversion pressure or other external social and environmental influences^[12].

After combing through the previous literature and theory, we know that user stickiness can be defined from the perspective of website and user respectively. Since this paper is based on the perceived value and emotional attachment of e-commerce platform users, from the user's perspective, user stickiness is defined as the behavior of users who will reuse the e-commerce platform when facing conversion pressure or other external social and environmental impacts.

3 Theoretical basis and research hypothesis

3.1 Theoretical Basis

"Cognition-Affect-Conation Pattern (CAC)" is a research paradigm developed from the field of cognitive psychology. Cognition refers to the mental activities of the human brain to receive, process, transform and absorb external information; Emotion is a subjective emotion or feeling produced by a person on the basis of cognitive information; Intentionality refers to the direction or willingness of a person to act in the future ^[13]. Cognition, emotion, and movement are interrelated, of which cognition is the basis for generating emotions and intentional movements, and the three together constitute attitudes, and attitudes are the bridge between external stimuli and individual behavior, affecting the specific behavioral responses of individuals due to external stimuli. These three stages have a sequential relationship between the user, which is manifested as the process of the user processing information, forming preferences, and finally having the corresponding behavioral willingness

Based on CAC theory, this project comprehensively considers the special subject nature of e-commerce live streaming environment, and from the perspective of user Perceived interaction on Tik Tok platform, with emotional attachment as the intervening variable. This project discusses the influence of perceived interaction on user stickiness and the internal mechanism. The model includes variables such as user control, entertainment, connectedness, responsiveness, platform identity, platform affection, and user stickiness. The theoretical model of this study is shown in Figure 1:

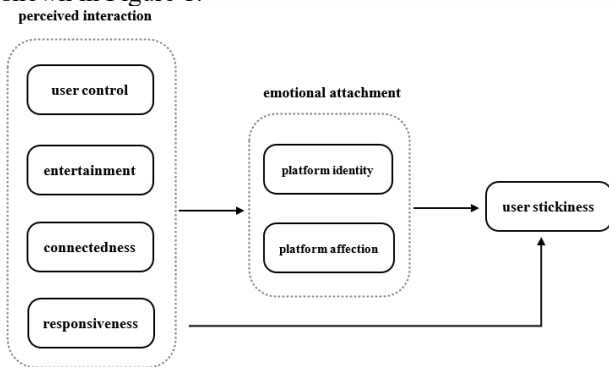


Fig. 1. Theoretical model of the research on the influence of perceived interaction on user stickiness in the context of e-commerce live broadcast.

3.2 Research Hypothesis

3.2.1 the relationship between perceived interaction and emotional attachment

So far, there have been few researches on the influence of perceived interaction on emotional attachment. Liu Dongmeng's research found that perceived interaction can positively affect emotional attachment through need fulfillment and self-extension^[14]. He Yuting studied user behavior from the perspective of interactivity, and found that improving user perception control, responsiveness and entertainment can strengthen the audience's emotional attachment to the live broadcast platform^[15]. Yinghaiyang found that interactive perception has a positive impact on platform attachment in the dimension of emotional attachment when studying users' intention to continue using paid knowledge platform^[16]. Therefore, the following hypothesis is proposed:

- H1a: User control has a positive impact on platform identity
- H1b: Entertainment has a positive impact on platform identity
- H1c: Connectedness has a positive impact on platform identity
- H1d: Responsiveness has a positive impact on platform identity
- H2a: User control has a positive influence on platform affection
- H2b: Entertainment has a positive influence on platform affection
- H2c: Connectedness has a positive impact on platform affection

H2d: Responsiveness has a positive effect on platform affection

3.2.2 The relationship between perceived interaction and user stickiness

Research on perceived interaction is rich and extensive in academic circles, most of whom regard it as a dependent variable and study its influence on customers' purchase intention and brand loyalty. Zhang Mengxuan's research found that under the stimulation of perceived interaction, customers will combine their own value judgment and purchase needs to form a positive emotional state -- customer integration degree with the brand, and then produce a positive behavioral response -- purchase intention^[2]. Xu Lihang based on the technology acceptance model confirms that perceptual interaction has a significant positive impact on user stickiness of travel apps^[17]. Cyr etc. found that the better the user perception of website interactivity, the more positive their comprehensive evaluation of all aspects of the website, and the higher their intention to visit again^[18]. Guan Qi research found that in the context of live broadcasting, it can further positively influence purchase behavior by increasing perceptual interaction to promote consumer trust in products^[19]. Therefore, the following hypothesis is proposed:

- H3a: User control has a positive impact on user stickiness
- H3b: Entertainment has a positive impact on user stickiness
- H3c: Connectedness has a positive impact on user stickiness
- H3d: Responsiveness has a positive impact on user stickiness

3.2.3 Relationship between emotional attachment and user stickiness

Karahanna etc. demonstrated that emotional responses, such as user satisfaction with the use of the site, promote sticky behavior^[20]. According to Fredricksson's emotional mechanism, scaling up emotional mechanisms in social networking services triggers experiential associations in users through emotional attachment, driving creative use of social platforms^[21]. Wang Liming etc. combined flow experience theory and emotional attachment theory to conduct an empirical study on the sticky behavior of consumers of booking travel apps, and confirmed that emotional attachment can positively affect user stickiness. Based on S-O-R theory and attachment theory, Yu Jia Yan confirms the emotional attachment of users to the knowledge payment community, helps the knowledge payment community to build and maintain good customer relationship management, and condenses user stickiness^[22]. Therefore, the following hypothesis is proposed:

- H4a: Platform identity has a positive impact on user stickiness
- H4b: Platform affection has a positive impact on user stickiness

3.2.4 Hypothesis of the mediating role of emotional attachment

Based on the Cognition-Affect-Conation Pattern theory, the perceived interaction of users in the e-commerce live broadcast scene is a cognitive process of users, the formation of emotional attachment is a series of emotions triggered by cognitive process, and the generation of user stickiness is a behavioral response of users. Therefore, this paper takes emotional attachment as a mediating variable between perceived interaction and user stickiness, which plays a mediating role in the process of perceived interaction affecting user stickiness. Therefore, the following hypothesis is proposed:

H5a: Platform identity mediates between perceived interaction and user stickiness

H5b: Platform affection mediates between perceived interaction and user stickiness

4 Data Analysis

4.1 Survey sample

In this study, electronic questionnaires were distributed as the main way, and the final questionnaire was formed by

Table 3. Model fitting index

Commonly used indicators	Judgment Criteria	Value
χ^2/df	<3	1.926
RMSEA	<0.10	0.056
CFI	>0.9	0.922
NNF	>0.9	0.907
TLI	>0.9	0.907
IFI	>0.9	0.923

4.2 Reliability analysis

4.2.1 Confidence analysis

This study used SPSS software to analyze the reliability of the collected data. Cronbach's alpha is generally considered to be greater than 0.7, which has good reliability. The overall reliability of the scale was 0.888, and the reliability coefficients of user control, entertainment, connectedness, responsiveness, platform identification, platform liking, and user stickiness were 0.749, 0.812, 0.722, 0.746, 0.827, 0.800, and 0.853, respectively, indicating that the questionnaire has good reliability.

4.2.2 Validity analysis

The scale used in this study is a mature scale from previous studies and has a certain degree of reliability, so validation factor analysis was selected for validity testing. Convergent validity was tested by the average extracted variance (AVE) and combined reliability (CR) of the latent variables, and the AVE values of each variable were greater

adjusting the questions several times after the pretest. The questionnaires were distributed from December 20, 2022 to January 17, 2023, and a total of 317 questionnaires were collected, 21 invalid questionnaires were excluded, and 296 valid questionnaires were used for analysis.

Among the respondents, women accounted for 48.65% and men accounted for 51.35%, which is a relatively balanced proportion. The age of the survey respondents was mainly concentrated in 29-38 years old, accounting for 48.65%, followed by 19-28 years old, accounting for 25%. The education level is concentrated in undergraduate and specialist, accounting for 39.53% and 30.74% respectively. The majority of people's occupation is enterprise staff, accounting for 53.38%. Salary distribution is more balanced, accounting for the most is 3001-60000 for 31.08%. The number of shopping in the last six months in the Jitterbug e-commerce live platform for 5 times and above accounted for 65.88% of the survey respondents, indicating that most of the survey respondents have some experience of shopping in the Jitterbug e-commerce live platform. Therefore, such a sample structure is suitable for the empirical analysis of the research question in this paper from all aspects. The specific results are shown in Table 3.

than 0.5 and the CR values were greater than 0.7, indicating good convergent validity. The square root of AVE of each variable was greater than the correlation coefficient of that variable, which proved that the data had good discriminant validity. The model fitting results showed that all indicators met the reference standard, indicating that the overall fit of the model was good, and the results are shown in Table 3.

4.3 Path analysis

The hypotheses were tested using path analysis. According to Table 4 we can see that (1) the path coefficients of user control, entertainment, connectedness, and responsiveness on platform identification are 0.164, 0.109, 0.276, and 0.186, respectively, and the corresponding p-values are less than 0.05, so H1a, H1b, H1c, and H1d are all valid. (2) The path coefficients of user control, entertainment, connectedness, and responsiveness on platform affection are 0.146, 0.228, 0.132, and 0.241, respectively, and the corresponding p-values are less than 0.05, so H2a, H2b, H2c, and H2d are all valid. (3) The path coefficients of user control, entertainment, connectedness, and responsiveness on user stickiness are 0.135, 0.302, 0.198, and 0.111, respectively, and the corresponding p-values are

less than 0.05, so H3a, H3b, H3c, and H3d are all valid.
 (4) The path coefficients of platform identity and platform

affection on user stickiness are 0.181 and 0.143, respectively, so H4a and H4b are valid.

Table 4. Fitting path test

Model Path	Standardized path coefficient	p	Hypothesis testing results
User Control → Platform Identity	0.164	0.002	Assumptions are valid
Entertainment → Platform identity	0.109	0.045	Assumptions are valid
Connectedness → Platform Identity	0.276	0.000	Assumptions are valid
Responsiveness → Platform Identity	0.186	0.000	Assumptions are valid
User Control → Platform Affection	0.146	0.007	Assumptions are valid
Entertainment → platform Affection	0.228	0.000	Assumptions are valid
Connectedness → Platform Affection	0.132	0.015	Assumptions are valid
Responsiveness → Platform Affection	0.241	0.000	Assumptions are valid
User control → User stickiness	0.135	0.003	Assumptions are valid
Entertainment → User stickiness	0.302	0.000	Assumptions are valid
Connectedness → User Stickiness	0.198	0.000	Assumptions are valid
Responsiveness → User Stickiness	0.111	0.018	Assumptions are valid
Platform identity → User Stickiness	0.181	0.000	Assumptions are valid
Platform affection → User Stickiness	0.143	0.003	Assumptions are valid

4.4 Mediating effect test

Kenny & Baron (1986) argued that the test effect of mediating effect should simultaneously satisfy the following conditions: (1) the independent variable significantly affects the dependent variable, (2) the independent variable significantly affects the mediating variable, (3) the mediating variable significantly affects the dependent variable, (4) when both the independent variable and the mediating variable enter the regression equation, if the coefficient of influence of the independent variable on the dependent

variable significantly decreases, it means that the mediating variable If the coefficient of influence of the independent variable on the dependent variable disappears significantly, it means that the mediating variable plays a full mediating role.

Since the path analysis has already verified the first three conditions above, to verify the mediating effect only condition 4 is needed. The independent and dependent variables are regressed separately to obtain model 1, and the mediating variables platform identity and platform affection are added to obtain model 2 and model 3, respectively, and the final model test is shown in Table 5 The final model test is shown in Table 5.

Table 5. Model Testing

	Model 1 (Effectiveness mark: user stickiness)		Model 2 (Effectiveness mark: user stickiness)		Model 3 (Effectiveness mark: user stickiness)	
	β	t	β	t	β	t
User Control	0.211	3.940***	0.174	3.280***	0.184	3.449***
Entertainment	0.360	7.393***	0.338	7.068***	0.322	6.533***
Connectedness	0.332	5.603***	0.264	4.384***	0.305	5.183***
Responsiveness	0.202	3.848***	0.161	3.071**	0.158	2.952**
Platform Identity			0.236	3.942***		
Platform Affection					0.199	3.235***
R ²	0.415	0.445	0.436	0.415	0.445	0.436
F	51.706***	15.539***	10.466***	51.706***	15.539***	10.466***

Note: * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$.

Combining the path analysis with the results in Table 5, it can be seen that the effects of user control, entertainment, connectedness, and responsiveness on user stickiness become significantly smaller after the addition of platform identity in Model 2, indicating that platform identity plays a partially mediating role; Model 3 The effects of user control, entertainment, connectedness, and responsiveness on user stickiness become significantly smaller after the addition of platform affection in Model 2, indicating that platform identity plays a partially mediating role. Therefore, H5a and H5b are valid.

5 Research conclusions and insights

5.1 Research findings

This paper integrates the theories of perceived interaction, emotional attachment and user stickiness, extracts the use of Jitterbug APP from the general e-commerce live context, and obtains data through pre-survey and formal survey to clarify the influence mechanism among perceived interaction, emotional attachment and user stickiness, and obtains the following research conclusions.

Perceived interactions significantly and positively affect emotional attachment. Perceived interactions were categorized into user control, entertainment, connectedness, and responsiveness. Based on the path coefficients, the hypotheses H1a, H1b, H1c, H1d, H2a, H2b, H2c, H2d all hold. It indicates that users' Perceived interaction with Jitterbug's platform will cause users to identify with and like the platform.

There is a significant positive correlation between emotional attachment and user stickiness, confirming that perceived interaction is an important antecedent variable of user stickiness. According to the data analysis, platform identification and platform love are generated, and it is likely that users prefer the Jitterbug e-commerce live streaming platform to the extent that they think of the Jitterbug e-commerce live streaming platform as soon as they have shopping needs, which is a reflection of generating user stickiness.

In addition, emotional attachment plays a partially mediating role in the influence of perceived interaction and user stickiness. The more users like to interact in the Jitterbug e-commerce live streaming platform, the more likely they are to discover the many advantages of the platform, and the more likely they are to like the Jitterbug e-commerce live streaming platform and develop attachments, thus enhancing user stickiness.

5.2 Revelation

Focus on user perceived interaction to enhance user stickiness. Pay attention to the development and design of e-commerce live streaming platforms to optimize user perception. In terms of optimizing user perceived interaction, emphasis can be placed on optimizing users' control, as well as platform response speed and platform entertainment. For example, for the entertainment of the platform, you can design some interesting content push.

Respond to user emotional attachment to enhance user stickiness. At present, consumers' demand for e-commerce live broadcast products and services has shifted from basic functional needs to personalized emotional needs. Therefore, it is necessary to focus on satisfying users' emotional demands and create unforgettable emotional experience for users.

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