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Exploring the Influence of Live Streaming in Social Commerce on Impulse Buying from a Affordance Perspective

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<u>**Full Research Paper**</u>

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Impulse Buying from a Affordance Perspective

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Abstract: As a new form of social commerce, live streaming still has the phenomenon of consumers' impulse buying. Based on S-O-R model, this study builds a theoretical model from the perspective of affordance to investigate the impact of live streaming in social commerce on consumers' impulse buying. We obtained data from consumers who watched live streaming in the form of questionnaires, and conducted empirical tests on the model. The results show that visibility, expressiveness, guidance shopping and trading affect consumers' social presence and immersion, and thus let consumers make impulse purchases.

Keywords: live streaming; Impulse buying; Affordance; Social presence; Immersion

1. INTRODUCTION

As a new type of social commerce, live commerce has become the main form of shopping for consumers. AI media consulting data shows that more than 50% of users purchase through live broadcast every month, and the scale of China's live commerce market will reach 961 billion yuan in 2020, with a year-on-year growth of 121.5%. China Consumer Association conducted a survey on the current situation of live e-commerce, and 44.1% of the respondents said that there was a serious phenomenon of impulse buying in live commerce. However, most of the existing researches focus on the business model, marketing strategy and customers' purchase intention, and there are still few researches focusing on impulse buying. In addition, previous studies on online impulse buying mostly explored online store display, product type, price, time pressure, etc. Although the contribution of these studies is obvious, the technical characteristics of live commerce are different from traditional social commerce. First of all, live commerce is no longer confined to the traditional "graphic details" to introduce product attributes, uses, appearance and other information. Instead, live streaming technology is used by the anchor to complete a comprehensive display and introduction of the product, so that customers can get more comprehensive and rich product information. Secondly, in traditional social commerce, businesses communicate with customers through text, but in live e-commerce, customers communicate with anchors and businesses in real time in the form of bullet screen, so as to improve the purchase efficiency [1]. Besides, in traditional social commerce, the lack of face-to-face interaction makes users doubt the authenticity of the goods, and increases the perceived risk of online shopping. In live-streaming room, the anchor can provide users with highly personalized services and guidance, thus having a meaningful impact on users' buying behavior.[2,3]. Therefore, previous studies can't be completely used in the live commerce situation. We need to consider the formation mechanism of impulse buying behavior from the live streaming itself.

Live commerce has a high level of human-computer interaction, so it is necessary to consider the characteristics of real-time interaction, high visualization and consumer perception. The concept of affordance can help us to consider the technical characteristics of live commerce and consumers' perception when interacting with these characteristics[4,5]. In live commerce, affordance comes from the interaction between users and technical features. Previous studies have demonstrated the effectiveness of affordance in social commerce. Therefore, we

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think that this concept is suitable for studying how live commerce, as a new form of social commerce, affects consumers' impulse buying behavior. The "stimulus-organism-response" (S-O-R) framework is widely used to explain impulse buying, which reflects people's internal cognitive and emotional processes in the face of external stimuli, resulting in positive or negative behaviors[6]. As the concept of the possibility of influencing user behavior in a certain way, there is a "black box" between affordance and impulse buying behavior, that is, the subject's cognition and emotion. When looking up the literature on live broadcasting, we found that social presence and immersion have received great attention[7,1]. Live shopping displays products in a direct and face-to-face way, creating a real-time experience for consumers. On this basis, the high interactivity provides consumers with an immersive experience, which makes it easier for consumers to perceive the brand and produce purchasing behavior. Although social presence and immersion have been identified as important antecedents of customers' purchase in live shopping, few studies have considered their role in consumers' impulse buying behavior at the same time.

The purpose of this paper is to study how live broadcast affects consumers' impulse buying behavior. In order to achieve this goal, based on the "S-O-R" model, this paper studies the influence of the technical characteristics of live shopping on consumers' impulse buying behavior from the perspective of affordance, and the mechanism of social presence and immersion in it. This study has practical significance for improving the product design of live broadcast platform and enhancing the effect of live broadcast marketing, and also helps to enrich the application of affordance theory in marketing and the theoretical research of consumer purchase behavior.

2. LITERATURE REVIEW

2.1 Impulse buying

In this article, impulsive buying was defined as the act of quickly making a decision to buy out of the plan due to the stimulation of the outside environment, and the customer's demand for the goods and inner emotions were stimulated. The main elements of this definition came from the existing online and offline impulsive purchase of documents.

Many researches shows that the basic feature of impulse buying is buying goods that are not originally planned and it can't be predicted [8], which means that it is adorable on the spot, that is, when an individual is exposed to shopping scenes, he is stimulated by external stimuli to acquire a certain commodity desire. Many scholars believe that impulse buying is caused by emotions, and the whole purchase process is relatively rapid. That is, under the stimulation of shopping environment, consumers who are in a positive state are easily influenced by the warm shopping atmosphere, so it is difficult to examine the attributes of commodities carefully and make the purchase decisions quickly.

Impulsive shopping is highly stimulating. The type of products, the price of the products, and the environment of the online store play a key role in luring customers to buy on impulse. In live commerce, anchors display the goods to the customer in the form of real-time video. Customers interact and communicate with the anchor in real time through bullet screen. In addition, the live location is not restricted. Anchors can create different ambience to stimulate consumers to impulse buying[9] After sorting out, it was found that the existing studies had tested the impulsive buying behavior in the livestream by taking the clues of livestream scene atmosphere, online interaction, lively and interaction of the product display as the main factors. However, these studies doesn't directly explain the different features of the live streaming technique and the relationship between impulsive buying, nor could they provide direct and powerful advice to the businessmen and platforms. Therefore, under the stimulation of the technical features of the live commerce platform, this research would explore the inner experience of the consumers and the impulse to buy.

2.2 The affordance theory

The affordance theory originates from ecological psychology and it is a possibility of activity between the

subject and the environment. It is an object attribute independent of people and closely related to each person's perception ability. In terms of affordance, scholars have different definitions due to different research fields. According to Dong and Wang, the affordance of social commerce refers to the possibility of implementing actions provided by technology for both sellers and buyers who have specific abilities and aim to purchase[10].

The concept of affordance is widely used to understand the relationship between IT technology and social practice. For example, IT affordance of social commerce platforms establishes strong and weak connections between customers and sellers[10], the formation of rapid guanxi between customers and sellers from the perspective of social commerce affordance[11]. Besides, the impact of live streaming on the purchasing intention of Chinese social commerce consumers, and the affordance of live streaming shopping platforms affects customers' purchasing intention [7]. In social commerce, affordance arises from the user's perception of the platform's technical characteristics. When consumers watch live streaming, they can perceive the characteristics of it based on the use of platform functions. Therefore, we believe that affordance, as a concept that can comprehensively consider technical characteristics and consumer perception, can be used to explain how live streaming affects consumers' impulse buying.

2.3 Social presence theory

As one of the most important theories in communication, social presence refers to the salience of others in interaction and the consequent salience of interpersonal relationship[12]. Social presence refers to the immediate sense of co-existence between an individual and other participants, as well as the degree of interpersonal relationship[13].This definition not only fully describes the connotation of social presence, but also focuses on immersive media and human-computer interaction scenes, which have a certain correlation with live streaming scenes.

With the development of computer technology and Internet, many scholars have found that social presence is not only an attribute of media. Therefore, many scholars have begun to try to divide social presence into multiple dimensions, so as to accurately describe the experience of users in various network scenarios. Previous studies showed that social presence can be expanded into three dimensions of awareness, affective social presence and cognitive social presence [14]. In the field of live streaming marketing, Xie Ying explored the influence of social presence on online conformity consumption from the perspective of behavior and neurophysiology, and divided it into coexistence presence, communication presence and emotional presence[15]. In the scene of live commerce, images are transmitted from one place to another using live streaming technology, which is of real-time reduction. In addition, consumers can obtain a large amount of real-time information from others on the spot through other people's behaviors such as thumb up, giving virtual gifts, and brushing bullet screens, so as to experience the feeling of physical presence of others, namely awareness . In the live streaming chat room, consumers can not only communicate with anchors and other consumers in real time, but also experience the emotional state of others through sending gifts and giving a like. So that customers can feel the salience of interpersonal relationship, that is, affective social presence. In addition, the individual in the live streaming chat room can have a certain understanding of others' ideas through communication, thus producing cognitive connection, that is, cognitive social presence. Therefore, this study takes awareness, affective social presence and cognitive social presence as three dimensions of social presence. Besides, when examining the multi-dimensional characteristics of social presence, we referred to the method of Shen and regard it as a second-order formative variable [14].

2.4 Immersion

Immersion was first proposed by Csikszentmihalyi, which describes the overall feeling of an individual when he or she is engaged in something, including psychological perception characterized by deep sense of concentration and pleasure, time distortion and control[16]. In the study of user behavior, immersion is often considered as an intrinsic motivation, which depends on the subjective feelings of the user and affects usage

behavior. Scholars at home and abroad have widely applied the conception of immersion in online games, online education [17], online shopping and other fields, and have confirmed its important role in user attitude and behavioral intention. As a highly interactive social commerce, live commerce is a combination of mobile live streaming and online shopping. When watching live e-commerce, due to high-frequency interaction, consumers often immerse themselves and forget the passage of time, thus creating a sense of immersion. Therefore, this study applies immersion as a mediating variable to the study of consumers' impulse buying behavior in live commerce.

2.5 S-O-R model

The "stimulus-organism-response" model (S-O-R) indicates that external environmental stimuli can affect the internal state of individuals and further affect individual behaviors [18]. In this model, stimulus refers to the effect of external environment on individuals, while organism refers to the internal state of each individual stimulated, and response refers to the behavior displayed by the individual. This model has been widely used in the study of consumer behavior in social commerce environment [3],[19],[20]. Considering the applicability of S-O-R model, this study regards it as the research model framework of consumers' impulse buying in live commerce.

To sum up, based on the S-O-R framework, it is proposed that live commerce affordance (S) can affect the social presence and immersion of consumers when watching live streaming(0), and then affect their urge to buy impulsively (R).

3. RESEARCH MODEL AND HYPOTHESES

3.1 Affordance and consumer internal experience

Existing studies have shown that in different scenarios, affordance has different attributes due to the different ways in which technical characteristics affect individual behavior to achieve goals. Dong and Wang identified its six dimensions: visibility, meta voicing, triggered attending, guidance shopping, social connecting and trading[10]. The impact of live streaming on the purchase intention of Chinese social commerce customers, and indicates that the visibility, meta-voicing and guided shopping in the affordance of live streaming shopping platforms affected the purchase intention of customers[7]. The visibility of the live streaming shopping platform shows the appearance and usage of the products to consumers in the form of real-time images, so that the products and brand information can be truly presented to customers in an all-round way. In the live streaming chat rooms, consumers can express their feelings and feedback through bullet screens, and the possibility that consumers can respond to the product or the content introduced by the anchor is expressiveness[7]. In the live streaming chat rooms, anchors can directly respond to the questions raised by consumers and help consumers establish product demands. This technical feature, which enables consumers to make purchase decisions through providing personalized services, is guidance shopping[7,10]. In addition, compared with traditional online shopping, the transaction process of live streaming is relatively complex, so the trading nature of the platform is the technical feature that makes the whole transaction process safe, smooth and efficient. Therefore, we believe that the affordance of live streaming shopping platforms can be divided into visibility, expressiveness, guidance shopping and trading.

3.1.1   Visibility affordance and consumer experience

Based on the visibility affordance, merchants can deliver detailed product information to consumers through live streaming. In this process, consumers can see all kinds of attributes and details of the product, and they will feel that they are observing the product on the spot. Through live streaming, consumers can also see the facial expressions and actions of anchors, further perceive their emotions. Thus, it can be argued that visual affordance helps customers perceive social presence. With the visualization technology characteristics of online video, live commerce has a high vividness, which can attract customers and make them immerse themselves in the constructed scene. At the same time, previous studies have pointed out that the vivid performance of product

display can bring customers a pleasant experience, so that customers are fully engaged to achieve the state of immersion[21].Therefore, the following hypotheses are made in this study:

H1a: In live commerce, visibility affordance has a positive influence on social presence of consumers.

H1b: In live commerce, visibility affordance has a positive impact on consumers' immersion.

3.1.2　Expressiveness affordance and consumer experience

Expressiveness affordance of living streaming provides the possibility of communication between consumers and anchors, which greatly improve the level of the interaction between them and let consumers perceive the anchor is a "real man" rather than the artificial intelligent robots. At the same time, consumers in the live streaming chat rooms have the opportunity to speak freely. They can communicate with other participants about the product or anchor's introduction in real time by using the bullet screen. Compared with the passive interactive environment, consumers can feel a higher level of social presence in this kind of active communication. In addition, high-frequency communication and interaction in the live streaming chat rooms can enhance consumers' perception of others, effectively shorten the distance between individuals, make the connection between each other more closely, and thus improve the sense of social presence [14].

Live broadcasting providers provide real-time communication platform for consumers and anchors by means of expressiveness. Through empirical research confirms the positive effect of interaction in cloud logistics information platform on user immersion experience[22]. Scholars like Hoffman and Nova believe that timeliness plays a crucial role in the audience's immersion experience in text based interaction[23]. Bullet screen is the only way to interact with consumers and hosts in live commerce. Consumers use bullet screen to express their ideas and communicate with others[11]. Pace found that the premise of feeling immerse was clear and timely feedback[24]. The comments in live commerce are expressed in real time, which has a strong time effect. This kind of instant presentation shorten the time difference of message communication, making the customers more excited and more immersed in the live streaming. Therefore, this research made the following assumptions:

H2a: In live commerce, expressiveness affordance has a positive influence on social presence of consumers.

H2b: In live commerce, expressiveness affordance has a positive impact on consumers' immersion.

3.1.3　Guidance shopping affordance and consumer experience

In live commerce, guidance shopping affordance can provide consumers with products that match their interests to meet their needs [7].As the suggestions provided by anchors have a high degree of relevance to customer needs, consumers will focus their attention on watching live streaming. Guidance shopping affordance can effectively help consumers solve the problems they encounter in the purchase process, so that consumers will perceive a high value of use, and such satisfaction will make consumers feel happy[25]. At the same time, anchors can provide purchase suggestions for customers according to their preferences and needs during the live streaming, which will make consumers feel that the services provided by live commerce are similar to those provided in offline shopping, so they will have an immersive feeling[25]. Anchors often recommend products or answer questions raised by consumers, such interaction is personalized and tends to interpersonal communication, and the sense of social presence will be further enhanced. Therefore, the following hypotheses are made in this study:

H3a: In live commerce, guidance shopping affordance has a positive influence on social presence of consumers.

H3b: In live commerce, guidance shopping affordance has a positive impact on consumers' immersion.

3.1.4　Trading affordance and consumer experience

Trading affordance provides a secure way of payment to consumers, enabling transactions to be launched smoothly on the live electronic business platform, which greatly improves the convenience of consumers in the purchase process. When the live commerce platform provides transaction protection for the public, users are more likely to have positive psychological hints. The presentation of guaranteed information can deepen customers'

cognition of goods and bring consumers a sense of shopping security[1]. When customers ask the anchor or business about the purchase process, their timely feedback is helpful for customers to form an overall understanding of the business and goods. When users click on the product link in the live room to pay the page, the live interface will show the word "user is going to buy". This prompts the customer to produce a co-existence society with others in their presence, and experience the positive feeling of accompanying shopping. In addition, the safety of the shopping process is closely related to the customer's immersion[26]. The security and reliability of the live commerce, as well as the authenticity of the anchors and businesses, can reduce the perceived risk of consumers, make them integrate into the shopping environment faster and produce immersion. Therefore, this study puts forward the following hypotheses：

H4a: In live commerce, trading affordance has a positive impact on social presence of consumers.

H4b: In live commerce, trading affordance has a positive impact on consumers' immersion.

3.2 Consumer experience and urge to buy impulsively

3.2.1   Social presence and urge to buy impulsively

Studies have proved that social presence makes consumers feel that online shopping environment is more transparent and customers will feel more secure when making purchase decisions, so it will enhance consumers' purchase intention[9]. The vitality brought by the technical features of live streaming enables consumers to learn more complete product information and more direct product experience, as well as the enthusiasm and friendliness of anchors, which can shorten the subjective distance between each other and let consumers have a sense of being on the scene. At the same time, the hypothesis of "social person" indicates that people have social attributes, and each individual does not want to exist in isolation. Through the communication with others in the live streaming chat rooms room, consumers will have positive interpersonal satisfaction and emotions. Under the guidance of positive emotions, they will reduce their perception of product risks and naturally tend to have a positive perception of the products recommended by the anchors so that to buy the products without a plan in advance. Therefore, the following hypotheses are proposed in this study:

H5: In live commerce, social presence has a positive impact on consumers' impulse buying.

3.2.2   Immersion and urge to buy impulsively

A number of studies have confirmed that consumers have a sense of immersion in the process of website browsing, which enhances unplanned purchase intention and the willingness to visit the website again. And immersion positively influences consumers' impulse buying intention[9]. When watching live streaming, high-frequency interaction with others can bring consumers a pleasant and satisfying immersive experience. Dripped by such positive experience, consumers are more inclined to make positive behaviors so that buy products that are not originally planned. Therefore, this study puts forward the following hypotheses:

H6: In live commerce, immersion has a positive impact on consumers' urge to buy impulsively.

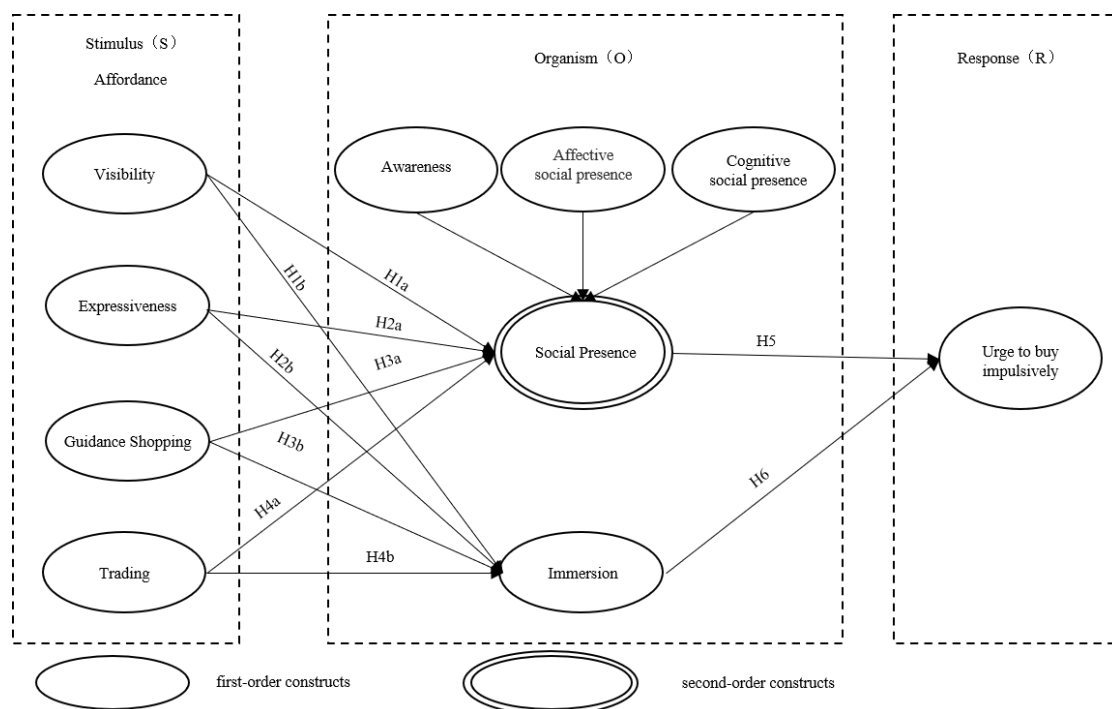The research model is shown in Figure 1.

Figure 1. Conceptual model

4. DATA AND METHODOLOGY

This study mainly focuses on e-commerce platforms and social media platforms with live streaming functions, such as Taobao, Jingdong, Pinduoduo, Tik Tok etc. We adopted the method of questionnaire survey. The first part of the questionnaire is the information of the respondents, a total of 5 questions; In the second part, seven variables including affordance, social presence, immersion and impulse buying were measured, with a total of 32 items, all of which were measured by Likert 7-scale (1= strongly disagree, 7= strongly agree). Most of the measurement items in this study are based on foreign literature. In order to ensure situational adaptability, the variable items in this study were slightly adjusted for the scenarios of live streaming shopping. Considering the popularity of online shopping at present, we first released questionnaires through WeChat and Moments, and then collected large sample data through the questionnaire star platform. This survey lasted 50 days from early November 2020 to late December 2020.

A total of 454 questionnaires were collected, of which 387 were valid, with a recovery rate of 85.24%. Among all respondents, 60.4% are female and 39.6% are male. In terms of age, 7.9% were under 18 years old, 42.5% were between 19 and 25 years old, 21.8% were between 26 and 30 years old, 10.1% were between 31 and 35 years old, and 17.6% were over 36 years old. In terms of education level, 18.5% of them have high school degree or below, 24.4% have junior college degree, 41.6% have bachelor degree and 15.4 have master degree or above. In terms of user experience, 77.2% of users have placed orders in live streaming, and 73.9% of those who watch live streaming for less than 2 hours a day.

5. DATA ANALYSIS AND RESULTS

Since social presence in this study belongs to second-order formative variables, and partial least squares method based on variance (PLS-SEM) can deal with small sample data, non-normal data and high-order formative variables, we use this method to calculate the model. And SMART-PLS3.3 was used for reliability and validity analysis and hypothesis test of the model. We followed the Ou's study using a two-stage approach with a mix of repeated indicator methods and latent variable scores. First, we use first-order variables to model and obtain the

reliability and validity of the latent variables. Secondly, the first-order variables were directed to the second-order variables, and the latent variable scores of the first-order variables were obtained by using the repeated index method. Then, the latent variable score of the first order variable is put into the second order model for calculation as the measurement item of the original variable.

5.1 Measurement model

In Smart-PLS, we use Cronbach's alpha and combined reliability (CR) to measure the reliability of data. The reliability test results of this study were obtained by executing PLS algorithm on all variables, including first-order variables. Table 1 shows that Cronbach's alpha values ranged from 0.88 to 0.94, and CR values ranged from 0.93 to 0.95. Both metrics thus exceed the required value of 0.7, indicating that the construct has good reliability. In this study, average variance extraction(AVE) were used to test the convergence validity. As shown in Table 2, AVE values of all constructs range from 0.63 to 0.85, thus exceeding the acceptable level of 0.5, indicating that convergence validity is also satisfied. According to the Fornell-Larcker criterion, the AVE square roots exceed the correlation coefficients of each latent variable, which confirms discriminant validity.

Finally, we examine the multicollinearity of indicators. The VIF values of all indicators range from 2.033 to 3.759, lower than the standard of 5[27]. In addition, the VIF values of the first-order variables were 2.257, 3.171 and 3.027, lower than the 3.3[27], which indicates that there are no major multicollinearity problems.

Table 1.   Cronbach's Alpha, Composite Reliability, AVE, and Correlations

	Cronbach's Alpha	CR	AVE	Furnell criterion									
				AW	CO	AF	IM	GS	UBI	EX	SP	TR	VI
AW	0.914	0.939	0.795	0.892									
CO	0.902	0.939	0.836	0.614	0.914								
AF	0.909	0.943	0.846	0.608	0.795	0.92							
IM	0.891	0.925	0.754	0.596	0.64	0.602	0.868						
GS	0.912	0.938	0.792	0.584	0.585	0.57	0.648	0.89					
UBI	0.883	0.927	0.81	0.517	0.526	0.558	0.578	0.547	0.9				
EX	0.931	0.951	0.828	0.611	0.595	0.56	0.59	0.586	0.511	0.91			
SP	0.937	0.946	0.639	0.859	0.896	0.894	0.694	0.658	0.604	0.67	0.799		
TR	0.909	0.943	0.846	0.549	0.541	0.556	0.591	0.529	0.471	0.556	0.622	0.92	
VI	0.905	0.933	0.778	0.682	0.645	0.618	0.682	0.65	0.586	0.697	0.738	0.647	0.882

Note: VI: visibility; EX: expressiveness; GS: guidance shopping; TR: trading; AW: awareness; AF: affective social presence; IM: immersion; UBI: urge to buy impulsively

5.2 Common method bias

As the questionnaire survey method is adopted in this study, the common method deviation may be caused by the topic characteristics, content deviation and other factors. Therefore, in order to whether there is a problem of common method biases, we included in the PLS model a common method factor whose indicators included all the principal constructs' indicators and calculated each indicator's variances substantively explained by the principal construct and by the method[28]. The results demonstrate that the average substantively explained variance of the indicators is 0.808, while the average method based variance is 0.002. The ratio of substantive variance to method variance is large. In addition, most method factor loadings are not significant. Given the small magnitude and insignificance of method variance, we contend that the method is unlikely to be a serious concern for this study.

5.3 Structural model

In order to obtain empirical results, we bootstrap 5000 times when using Smart-PLS to calculate path

coefficient and T-values. We also ran PLS Algorithm to get R2. Table 2 and Figure 2 show the structural equation model test results. First, visibility (0.334, p<0.001), expressiveness (0.208, p<0.001), guidance shopping (0.229, p<0.001) and trading (0.169, p<0.001) have positive influence on social presence, so H1a, H2a, H3a and H4a are supported. Second, visibility (0.297, p<0.001), expressiveness (0.109, p<0.05), guidance shopping (0.294, p<0.001) and trading (0.183, p<0.01) have positive impact on immersion, so H1b, H2b, H3b and H4b are supported. In addition, social presence (0.392, p<0.001), immersion (0.307, p<0.001) have positive impact on the urge for consumers to buy impulsively, so the H5, and H6 are supported.

R^2 represents the proportion of the dependent variable in the model that is explained[27]. As shown in figure 2, the urge to buy impulsively R^2 value of 0.411, it shows that about 41.1% of the urge to buy impulsively is explained by social presence and immersion. Similarly, the R^2 of social presence is 0.638, and the R^2 of immersion is 0.561, indicating that the visibility, expressiveness, guidance shopping and trading of live streaming platforms have a good explanatory power for social presence and immersion. The overall model has above medium explanatory power.

Table 2. Hypotheses Testing Results

	Path	Path coefficients	Standard Deviation	T-values	P-values	Supported?
H1a	VI -> SP	0.334	0.054	6.158	0.000	yes
H1b	VI -> IM	0.297	0.061	4.896	0.000	yes
H2a	EX -> SP	0.208	0.045	4.659	0.000	yes
H2b	EX -> IM	0.109	0.050	2.153	0.031	yes
H3a	GS -> SP	0.229	0.043	5.387	0.000	yes
H3b	GS -> IM	0.294	0.050	5.880	0.000	yes
H4a	TR -> SP	0.169	0.048	3.560	0.000	yes
H4b	TR -> IM	0.183	0.049	3.766	0.000	yes
H5	SP -> UBI	0.392	0.046	8.429	0.000	yes
H6	IM -> UBI	0.307	0.052	5.865	0.000	yes

5.4 Post hoc assessment of mediating effects

In order to verify whether affordance influences impulse buying through social presence and immersion, the we use bootstrapping method in Smart-PLS to test the mediating effect of social presence and immersion. Table 3 shows the results of the mediating effect assessment test. It shows that social presence mediates the impacts of visibility (0.131, p<0.001), expressiveness (0.081, p<0.001), guidance shopping (0.09, p<0.001) and trading (0.066, p<0.01) on the urge to by impulsively and that immersion mediates the impacts of visibility (0.091, p<0.001), guidance shopping (0.08, p<0.001) and trading (0.056, p<0.001) on the urge to by impulsively. Meanwhile, immersion has no mediating effect of expressiveness (0.033, p<0.05) on the urge to by impulsively.

Table 3. Results from testing the mediating effects of immersion and social presence

Constructs			Indirect Effect(IV-M-DV)			Mediating Effect
IV	M	DV	Path coefficients	T-values	P-values	
VI	SP	UBI	0.131	4.853	0.000	Significant
EX	SP	UBI	0.081	3.827	0.000	Significant
GS	SP	UBI	0.090	4.485	0.000	Significant
TR	SP	UBI	0.066	3.422	0.001	Significant
VI	IM	UBI	0.091	3.652	0.000	Significant
EX	IM	UBI	0.033	1.956	0.050	Significant
GS	IM	UBI	0.080	4.000	0.000	Significant
TR	IM	UBI	0.056	3.269	0.001	Significant

Note：***：p<0.001，**：p<0.01，*：p<0.05，ns：not significant
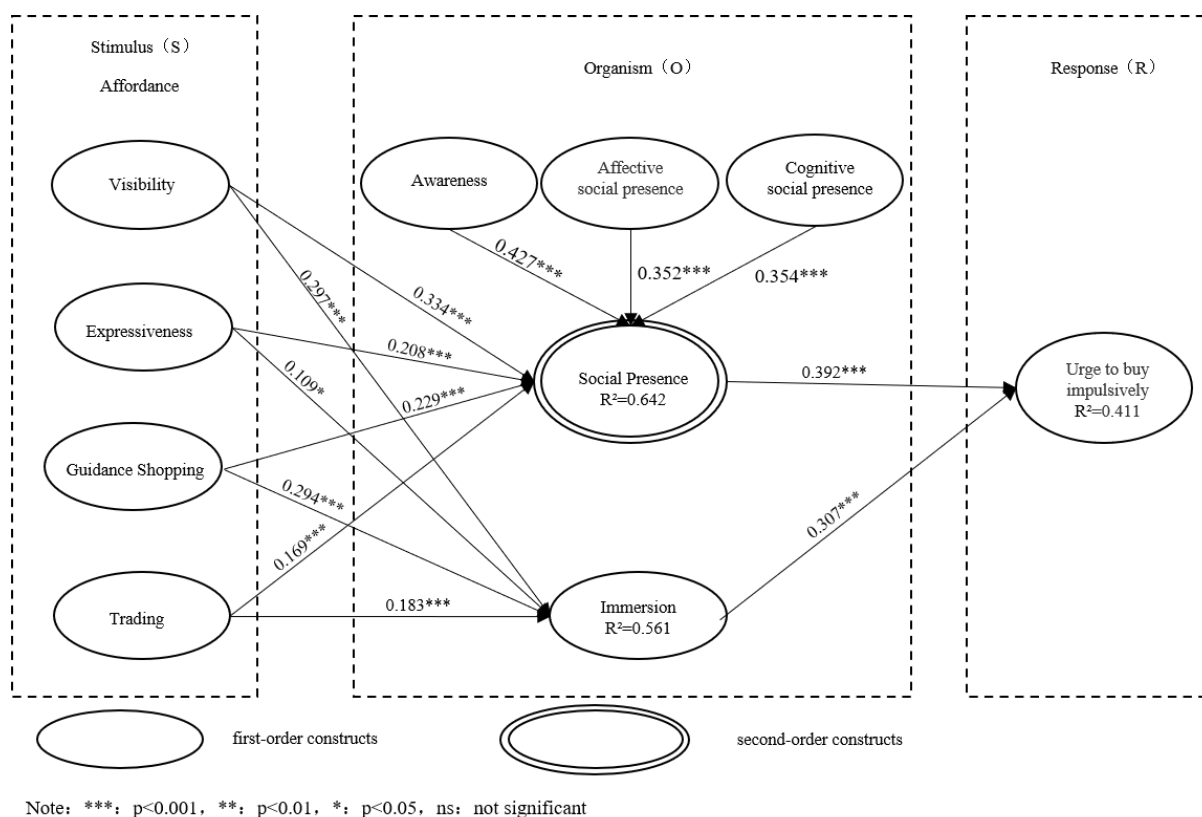
Figure 2.　Model testing results

6. Conclusions and implications

This study mainly explores the impact of consumers' impulse purchase in live commerce, and proposes a theoretical framework for the impact of the affordance of live streaming platforms on consumers' impulse buying from the perspective of affordance. On this basis, combining with the existing theoretical research, We take the affordance of live streaming platform (visibility, expressiveness, guidance shopping, transactional) as independent variables, social presence (awareness, affective social presence, cognitive social presence) and immersion as mediating variables, and impulse buying behavior as dependent variables to establish a theoretical model. Then we conduct empirical analysis on the theoretical framework and the results show that all the hypotheses are valid.

6.1 Theoretical implications

Based on the perspective of affordance, this study explains the mechanism of consumers' impulse buying behavior in live commerce and provides a theoretical framework for future research. For the first time, this study attempts to define the multi-dimensional concept of social presence in the context of live streaming and divides it as a formative variable into awareness, affective social presence and cognitive social presence. This construction and analysis method is supported by past studies and empirical conclusions, and also provides an analytical approach for future multidimensional studies of social presence. Besides, our research makes up for the existing research vacancy on the impact of live streaming in social commerce on impulse buying of customers.

6.2 Practical implications

For live streaming shopping platforms, efforts should be made to improve interface visibility, communication with consumers and convenience of transaction process. In terms of visibility, live streaming shopping platforms should improve the clarity of live streaming images and adopt VR to enhance viewing experience. In view of expressiveness, live streaming shopping platforms should strive to provide consumers with a relaxed and pleasant communication environment; In terms of communication mode, the response time should be shortened so that

consumers can get a timely reply after expressing their questions or opinions. The platform should enhance the design expression of consumers' non-verbal behaviors, such as paying attention to the design of facial expressions, so that consumers can communicate their intentions more conveniently and vividly. Aiming at the guidance shopping, the platform can quickly classify a large number of bullet screens by keyword identification, so as to provide help for the personalized service of main live streaming. As for the transaction process in live streaming, the platform should enhance the security of the transaction process and simplify the transaction process, so that consumers will not weaken their positive emotions due to the complex and cumbersome transaction process.

6.3 Limitations and future research

There are still some shortcomings in this study. First, it is difficult to collect the actual purchase data of consumers and it is impossible to judge whether it is an impulse purchase only from the data, this research only adopts the form of questionnaire to investigate the impulse purchase of consumers. Therefore, future research could use experiments or the collection of actual purchasing data to study the impulse buying behavior in live streaming shopping. Secondly, this study takes social presence and immersion as mediating variables, but previous studies have shown that there may be other mediating effects between consumers' receiving of external stimuli and their impulse buying behavior. Therefore, future studies can consider whether there are other mediating variables and use longitudinal data to test the mediating effect. Thirdly, due to the complexity of the model, the study did not add regulating variables. However, in reality, consumers' impulse purchase in live e-commerce is influenced by many factors, so future research can consider personal impulse traits and commodity types as moderating variables for further study.

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