

Research on Product Recommendation and Consumer Impulsive Purchase Under Social Commerce Platform—Based on S-0-R Model

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ABSTRACT

This article builds its own model and assumptions on the basis of the S-0-R model. It examines the impact of third-party product recommendations on consumer impulse purchases on social commerce platforms, and conducts empirical research on several popular product recommendation platforms in China. According to a survey of 201 social commerce platform consumers, the results indicate that the urge to buy impulsively is determined by the affective trust of the recommender and the perceived enjoyment of the product. In addition, the speciality of the information and the similarity with the recommender significantly affect cognitive trust. Visual appeal of products and feasibility significantly affect perceived enjoyment. Visual appeal of products exerts an impact on perceived usefulness, and affective trust is influenced by the speciality.

Keywords: *product recommendation, urge to buy impulsively, S-0-R model, perceived enjoyment, perceived usefulness, cognitive trust, affective trust*

1. INTRODUCTION

Social commerce platforms focus on consumer-driven commerce and social interaction, which is different from traditional e-commerce. Traditional e-commerce focuses on product-centric trade and provides merchant-led information[1]. Social commerce platform is an online shopping platform based on Web2.0 (promoting user-generated content and social interaction), which can connect consumers and allow consumers to discover, share, recommend, evaluate and purchase products [2]. Social commerce platform can help consumers make decisions and purchases. According to a 2016 report by McKinsey, half of all online consumers rely on social media to get recommendations and make purchasing decisions. This trend is likely to increase as consumers become more satisfied with social media and social commerce.

Many recent studies have investigated how various elements in information systems affect impulse purchases. In the context of e-commerce, online store belief, system design, website quality, website attributes, website atmosphere can affect impulse buying[3]. Zheng (2019) studied the role of browsing in mobile commerce. The influencing factors include interpersonal influence, visual appeal, portability, hedonistic, and utilitarian browsing[4]. Chen (2019) studied the impact of official WeChat recommendations on impulse purchases, including cognitive and affective trust, and product emotions [1]. Radon (2019) considered the importance of a boring state of mind on the impulse purchase, and the study variable was mainly tired of shopping motivation

[5]. Practice and research show that product recommendations on social media can affect planned and impulse purchases. More and more consumers seek product recommendations and accept product recommendations. To effectively manage the vast amount of information available in the online search process, consumers will use the advice of their peers as a decision-making inspiration, regardless of whether the referrer's personality is similar to their own[6]. Consumers rely on online product recommendations before making a final purchase decision. If the recommended blogger is trustworthy, and the recommended content is useful, then readers' online shopping behavior may be affected [7]. Hsu et al. investigated the impact of blog recommendations on consumers' willingness to buy online. Lo also pointed out that product recommendations that meet consumer expectations are the motivation factors leading to online impulse purchases [8]. Therefore, we can make reasonable inferences that product recommendations have an impact on consumer purchases and stimulate consumers to buy online impulsively [9].

In summary, this study explores the impact of product recommendations in social commerce on consumer impulse buying behavior based on the S-0-R model. We studied five e-commerce platforms, such as Tiger Flutter, Poison, Little Red Book, bilibili, and Douyin, to influence users' impulse purchases by providing product recommendations such as text, image, and video sharing. The existing product recommendation articles mainly focus on planned purchase behaviors, but few scholars study influence impulse purchases on product recommendations. Chen et al. is an exception. He uses

signal theory to explore how product recommendation affects impulse purchases in WeChat social commerce. He discusses the application of signal theory and discusses how official WeChat recommends products to consumers in the form of posts. This article mainly uses the stimulus-response - organism (S-O-R) framework to study the role of external stimuli in impulse purchases. The recommender in this article is not the official seller, but a third-party recommender who has used this product. Existing literature on impulse buying is mainly focused on e-commerce, and how impulse buying is affected by the characteristics of online stores, such as website quality, store beliefs, and website atmosphere. This research focuses on emotional factors, using cognitive trust and affective trust in recommenders as the main factors affecting impulse buying. It also studies how the perceived usefulness of the product and perceived enjoyment affect users' impulse buying behavior. Current research shows that affective trust and perceived enjoyment are the core elements that affect impulse buying in social commerce. In the rest of this article, we introduced the research methods and empirical results, and finally summarized the research conclusions and management implications.

2. LITERATURE REVIEW

2.1 impulse purchase

Impulsive purchase is an unplanned purchase, which is characterized by sudden, irresistible, hedonistic complex behaviors and lack of thinking [10]. Piron (1991) defined impulse purchases as "unplanned purchases that are the result of stimulus and are decided on the spot" This behavior is usually caused by specific stimuli during the shopping process [11]. Xiang (2016) studied the impact of social interactions on impulse purchases on social commerce platforms. Studies have shown that visual appeal can positively affect users' perceived usefulness of SCPs. Task-suitable information has a positive impact on the speciality of SCPs perceived by users. The perceived usefulness will positively affect users' perceived pleasure, etc. [12]. Therefore, this article selects visual appeal, feasibility, perceived enjoyment, and perceived speciality as variables to study impulse buying. Chen (2019) studied the impact of official WeChat recommendations on impulse purchases, and studied the impact of cognitive and affective trust and product emotions on impulse purchases based on signal theory. Therefore, this paper selects the cognitive trust and affective trust two variables [1]. At the same time, in the process of impulse purchase, consumers perceive or notice the stimulus, and absorb it to respond [13]. This study uses impulse buying as an alternative to actual impulse buying. Theoretically, the desire to buy is considered as a necessary precursor of impulse buying behavior, and this concept has been verified in some empirical studies [14].

2.2 S-O-R model

The S-O-R model is derived from environmental psychology and believes that stimuli will induce individuals' perception and then affect their response [15]. The S (stimulus) is defined as all factors that are specific to the time and place of observation. These factors are not based on knowledge of individuals and the properties of the stimulus, and have a clear systemic effect on current behavior[16]. The O (organism) is the internal state of the individual, represented by emotional and cognitive states. It is also considered to be an intermediary state between stimulus and response [17]. The R (response) is a response to their views based on different situation factors [18]. In the process of impulse purchases, consumers' reactions can be divided into two aspects. The first stage is the impulse to buy impulsively, which was defined by Beatty and Ferrell (1998) as "a state of desire experienced when encountering objects in the environment" [19]. The next stage is the actual impulse purchase, which only happens after the individual has experienced the impulse to buy. Previous research has used behavioral intentions rather than actual behaviors for two reasons. First, in marketing research, behavioral intent has been designated as a substitute for actual behavior [20]. Second, some scholars believe that observing actual behavior in a controlled environment is problematic and personal reactions or behavior may produce biased because they need to act or react in a society expect. Therefore, this study adopts the urge to buy impulsively to measure the individual's impulse, rather than using impulse buying behavior.

2.3 Social commerce platforms and product recommendations

2.3.1 Social Commerce Platform

Social commerce is a combination of social media and e-commerce, and its essence is to conduct various business activities by utilizing online social capital in social media [21]. A new form of social commerce platform focusing on image sharing has appeared in 2006. Similar to most Web 2.0 applications, image sharing social commerce platforms focus on specific consumer groups, such as women, and specific products [22]. On social commerce platforms, when others provide useful product information, users who accept the shared information will think that others are caring and helpful. After receiving this information, users will be willing to obtain or share valuable shopping information with others. Frequent sharing of supportive information can enhance friendship and trust among users, which may further increase users' willingness to conduct business activities [23].

2.3.2 product recommendations on the social commerce platform

Product recommendation posts posted on social commerce platforms are self-made recommendation posts created by consumers (bloggers) with direct purchase links. These suggestions contain detailed information about recommended products, such as product features, pictures, product experience, and product benefits and benefits. This information is usually presented in a storytelling style with specific user experience. Support for different fonts, colors, layouts, and graphics in recommended posts. Content can also include audio and video. In addition, bloggers can also publish long articles, allowing more comprehensive content [1]. FIND believes that blogger recommendations constitute an informal communication channel compared to formal commercial marketing channels such as advertising. Consumers usually follow bloggers' suggestions actively because their opinions are non-commercial. Based on experience, Lim confirmed that the recognition of satisfied consumers significantly affects the purchases of other consumers. In addition, Bernoff believes that bloggers and their fans can have a lot of direct interaction because most social

commerce platforms are two-way communication channels, not just one-way commercial advertisements. As a result, blogger suggestions are more reliable and valuable than business information (Wu, 2011).

3. RESEARCH MODELS AND ASSUMPTIONS

Based on the above research, Figure 1 summarizes the research model of this paper. This paper is modified based on YanhongChen's research model to make this model more suitable for this research. This study explores the impact of product recommendations on impulse buying behavior in social commerce. Drawing on the S-O-R model, this paper studies the effects of the visual appeal of recommended products and the feasibility of recommended products on perceived usefulness and perceived enjoyment, this article also explores the relationship between the speciality and similarity of recommenders cognitive trust, affective trust. In addition, we also study perceived enjoyment and affective trust in how to influence the urge to buy impulsively.

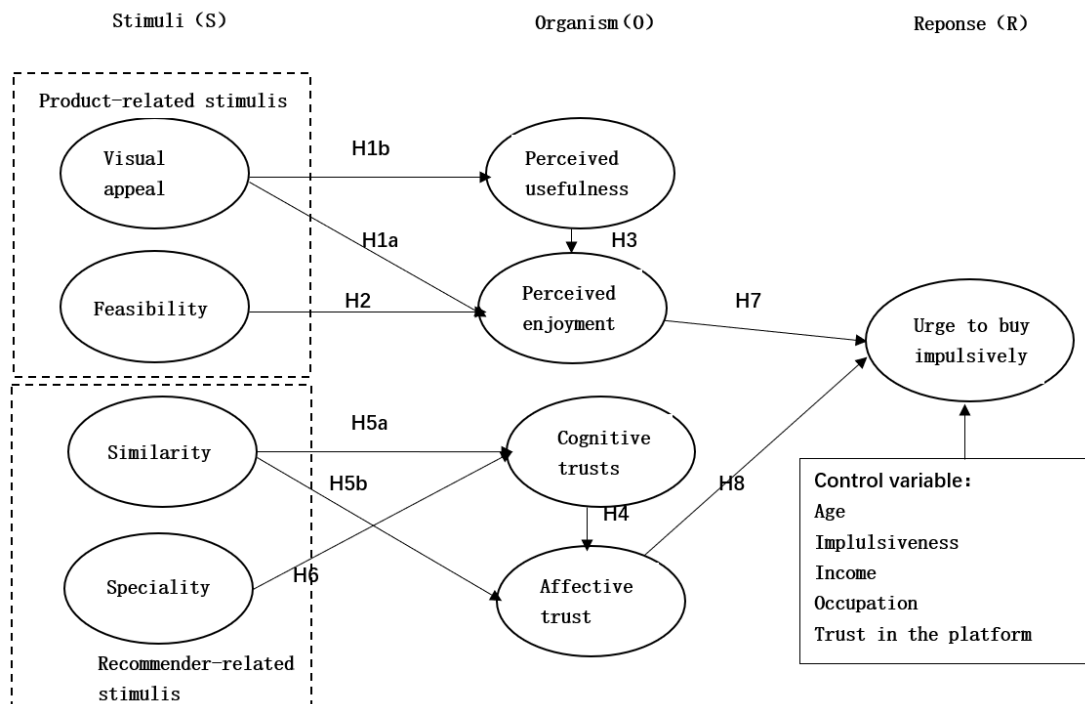


Figure 1 Research model

3.1 product-related cognitive stimulation and emotional responses (perceived speciality, perceived enjoyment)

Environmental psychologist Eroglu (2011) divides the characteristics of the website into TR and MR characteristics and regards them as

stimuli to consumer response. The TR function is defined as "all site descriptors that promote and achieve consumer shopping goals." The MR function is designed to create "an atmosphere that may make the shopping experience more enjoyable" and indirectly affect the completion of shopping tasks [24]. The site's environmental characteristics (ie, TR and MR characteristics) can cause users' cognitive and emotional responses (ie, perceived speciality and perceived enjoyment). Information

feasibility is the degree to which the information presented on the website is accurate, professional, and suitable for the current task [25]. Perceived enjoyment is defined as the enjoyment experienced when browsing MR-enabled web pages. MR features are reflected through visual appeal. Visual appeal refers to the presentation of product information through multiple optical elements and hedonistic features. Together they form a lively and entertaining presentation of information, thereby enhancing the user's emotional response to the product, and the easier it is. Feel enjoyed while browsing. So we have:

hypothesis H1a. The visual appeal of the recommended product is positively associated with the perceived enjoyment of the recommended person.

By using the specific features of the image-sharing social commerce platform, the perceived speciality is defined as "the degree to which users think they can increase their shopping productivity [26]. Many studies have shown that attractive and pleasing product information representation can be enhanced Consumers' positive response to the product. The more visual elements users perceive from social commerce, the more likely they are to see social commerce as a useful shopping platform. The more valuable users of social commerce find this platform, the more trust they have Higher. Therefore, we have:

hypothesis H1b. The visual appeal of the recommended product is positively associated with the perceived usefulness of the recommended product.

According to the model of Parboteeah et al. (2009), in the context of social commerce platforms, a large number of high-quality pictures can bring visual enjoyment to users, which makes users excited and happy. The higher the feasibility of the recommended product, the stronger the user's sense of pleasure when browsing. Therefore, we hypothesize:

hypothesis H2. The feasibility of the recommended product is positively associated with the perceived enjoyment of the recommended person.

The relationship between cognition and emotion has been extensively studied and it has been found that cognition has a positive effect on emotion. The more useful a social commerce platform is considered, the more fun it is to use. If social commerce can effectively solve tasks related to online shopping, users may find it pleasant to use and may form emotional relationships. Therefore, we hypothesize:

hypothesis H3. Perceived usefulness positively affects perceived enjoyment.

3.2 relevant stimuli and trust recommenders (cognitive trust and affective trust)

Cognitive trust depends on the evaluation of the other party's past performance, that is, the person's previous ability and reliability. Affective trust comes from social interaction with others, reflecting the trust in others and the concern for the welfare of others [27]. Knowing that trust

is objective in nature, it is based on a cognitive process that determines whether the other party in the relationship can trust it [28]. Affective trust is based on the feelings of an individual based on the beliefs of concern and care shown by a partner. Partner trust and affective trust are subjective in nature because one's perceived trust is based on the other's feelings. Although there may be a two-way causal relationship between cognitive trust and affective trust in principle [29], past research has shown that cognitive trust is the pioneer of affective trust [30]. Based on the above, we hypothesize:

hypothesis H4. cognitive trust will positively affect affective trust.

Similarity refers to the similarity in the values, experiences, or experiences of recommenders and referees. Existing research shows that people are willing to believe in the same people as their own experiences, so similarity has an impact on cognitive trust. So we have:

hypothesis H5a. The similarity of the referrer positively affects emotional trust.

When the recommender considers the referee to be trustworthy, the psychological distance between them will decrease, which in turn will increase the emotional range, so similarity has an impact on affective trust. Therefore, we have:

hypothesis H5b. The similarity of the referrer positively affects emotional trust

Speciality refers to the professional degree of the recommender for the recommended product, such as product characteristics and product efficacy. When the referee feels the speciality of the recommender, a kind of cognitive trust will be generated. So we hypothesize:

hypothesis H6. The referrer's speciality positively affects cognitive trust.

3.3 perception of enjoyment, confidence and emotional impulse buying impulse

With the increase of intrinsic satisfaction, users' exploration behavior may be stimulated. In online environments, if online consumers enjoy their shopping experience, they may conduct more exploratory browsing on the network, leading to more unplanned purchases. Therefore, we hypothesize:

hypothesis H7. Perceived enjoyment positively affects the urge to buy impulsively.

Previous research has shown that emotional responses determine the impulse of individual impulse purchases [31]. The motivation of people using these platforms is mostly hedonistic, so psychological factors dominate, and consumers in a positive emotional state tend to make decisions faster and more effectively, which may lead to impulse purchases. So we have:

hypothesis H8. The affective trust will positively affect the urge to buy impulsively.

4. RESEARCH METHODS

4.1 Sample and data collection

The scale used in this article is a mature foreign language scale. To ensure the quality of the questionnaire, we use translation - reverse translation, reasonable translation items, and writing instructions. First of all, a preliminary survey was conducted, and the research items have been revised. Questionnaires were distributed to 80 undergraduate and graduate students. Completed ones will receive a red envelope reward of 1 yuan. Then use the "questionnaire star" platform for large sample collection.

Our questionnaire was conducted online. Excluding invalid and contradictory polls, a total of 201 valid questionnaires were collected. Among them, 86.57% were aged below 25 years. The sample is consistent with findings from previous pre-surveys that users are young. Respondents most frequently used platform for the bilibili, Douyin ,and Little Red Book. Nearly half of the respondents are students. 76.62% of respondents spent more than 10 minutes a day on such APPs. Discretionary income above 500 yuan per month accounted for 85.07%.

4.2 Variable measurement

The questionnaire is divided into two parts: the first part is the demographic information of the respondents, including the use of the platform, age, occupation ,and time spent on the platform every day. The second part includes all constructs in the search model. Most of the projects constructed were adapted from previous studies to make them suitable for this study. Items were measured using a seven-point Likert scale from " 1- Disagree" to " 7- Disagree".

4.3 Control variables

To test the validity of the research model, we include control variables that may affect impulse purchases. Age affects impulse buying, and young consumers

aged 18 to 39 are more likely to buy impulsively. People with a high degree of impulse are more likely to experience a strong impulse to buy impulsively. In addition, income, occupation, and degree of trust in the platform are also included in the control variables.

5. THE EMPIRICAL RESULTS

5.1 Common method deviation test

Because our study data was collected from a survey, Harman 's one-way test was performed to test the bias of the general method. The results showed that unrotated exploratory factor analysis showed that the most significant factor explained 34.52 % of the total variance. No single factor dominates the total variance, thus indicating that common method bias is unlikely to be a significant problem in our study.

5.2 Reliability and validity analysis

This study used AMOS 21 and SPSS 22 software to validate the proposed model and hypothesis through the structural equation model (SEM). Before examining the hypothesis, we used confirmatory factor analysis (CFA) to test the reliability and validity. Factor analysis is used to ensure authenticity and to determine validity by reducing the number of items in each dimension.

According to the standards suggested in previous studies, Cronbach 's α must be greater than 0.7 to ensure that the survey questions are sufficiently reliable. Also, this study used three indicators for validity analysis: factor loading, combined reliability (CR) and extracted mean variance (AVE). These results indicate that the factor load of each latent variable corresponding to each topic is more significant than 0.7, indicating that each latent variable is highly representative of the corresponding item. Besides, the AVE of each latent variable is more significant than 0.5, and the combined reliability CR is more significant than 0.8, indicating that the convergence efficiency is ideal.

Table 1 Project reliability

Construct	Item	Estimate	AVE	CR
Visual appeal (VIS)	VIS1	0.899	0.8199	0.9317
	VIS2	0.872		
	VIS3	0.944		
Feasibility (FEA)	FEA1	0.903	0.6905	0.8156
	FEA2	0.752		
Speciality (USE)	USE1	0.833	0.7011	0.9037
	USE2	0.841		
	USE3	0.852		

	USE4	0.832		
Similarity (SIM)	SIM1	0.833	0.7595	0.9044
	SIM2	0.876		
	SIM3	0.904		
	PUS1	0.88		
Perceptually Useful (PUS)	PUS2	0.862	0.7587	0.8628
	ENJ1	0.92		
Perceived enjoyment (ENJ)	ENJ2	0.856	0.7655	0.9072
	ENJ3	0.847		
	COG1	0.861		
Cognitive Trust (COG)	COG2	0.806	0.7113	0.8807
	COG3	0.862		
	AFF1	0.866		
Affective trust (AFF)	AFF2	0.867	0.7357	0.8931
	AFF3	0.84		
	IMP1	0.862		
Urge to buy (IMP)	IMP2	0.873	0.8076	0.9263
	IMP3	0.958		

All standard loadings were significant at $p < 0.001$

Table 2 Validity Analysis

	feasibility	professional	Similarity	Perceptually useful	Perceived enjoyment	Cognitive trust	Affective trust	Visual appeal	Urge to buy
feasibility	0.831								
professional	0.351	0.837							
Similarity	0.432	0.366	0.871						
Perceptually useful	0.571	0.298	0.525	0.871					
Perceived enjoyment	0.612	0.442	0.643	0.614	0.875				
Cognitive trust	0.454	0.368	0.548	0.512	0.512	0.843			
Affective trust	0.534	0.526	0.547	0.496	0.634	0.578	0.858		
Visual appeal	0.547	0.239	0.451	0.537	0.527	0.465	0.474	0.905	
Urge to buy	0.427	0.187	0.393	0.365	0.421	0.434	0.471	0.544	0.899

Discriminant validity is used to measure the correlation between factors. The correlation coefficients of all factors must be greater than those of the others (Fornell and Larcker, 1981). As shown in Table 2, the square root of AVE of all factors is greater than the correlation coefficient with other factors, indicating that the questionnaire has acceptable discriminative validity.

5.3 Goodness of Fit

We evaluated the goodness of fit of the research model by χ^2/df , RMSEA, GFI, AGFI, CFI, and IFI. Value of χ^2/df (1.409) is less than 3; the RMSEA (0.034) is less than 0.06; the GFI (0.939) is larger than 0.9; AGFI (0.916) is larger than 0.9; CFI (0.971) is greater than 0.9; IFI (0.983) is close to 0.9. All of them

suggested a good fit between the research model and the data.

5.4 Structural Model Evaluation

This research uses Mplus and bootstrapping to analyze the research model, and all assumptions are supported. In addition, the three control variables of age and impulsivity and the degree of trust in the platform have a significant positive impact on consumers' urge to buy impulsively. R^2 indicates the proportion of variance in a dependent variable explained by the exogenous variables. The R^2 's for perceived enjoyment, perceived usefulness, cognitive trust, affective trust, and urge to buy impulsively were larger than 0.2; the results show that the model has good explanatory power on the dependent variable.

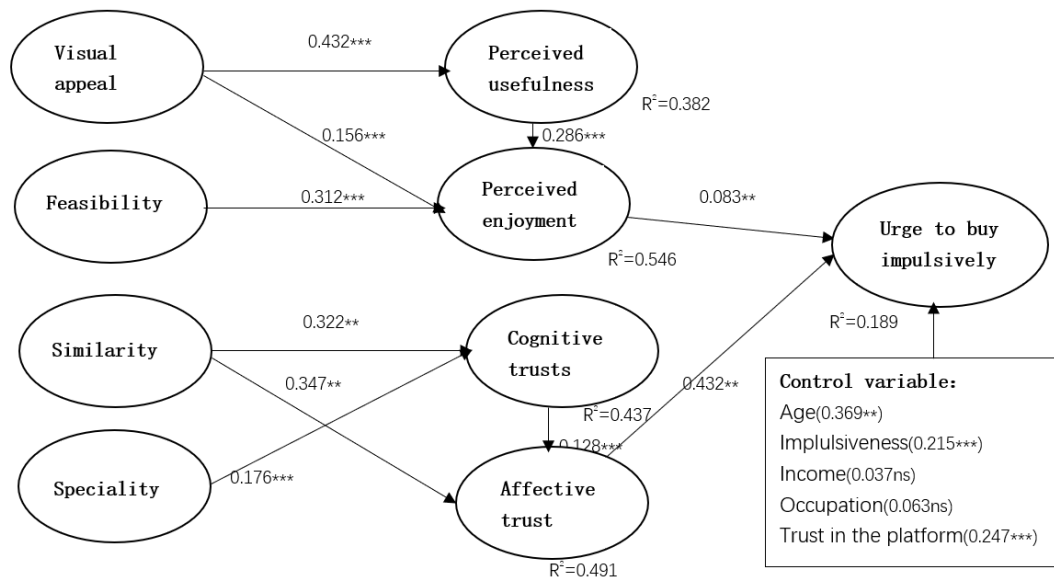


Fig 2 Research model testing results (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ns: not significant at the 0.05 level)

As shown in the figure, it is found that the exogenous variables (visual appeal, feasibility, speciality, and similarity) of the current research model explain the endogenous variables (perceived usefulness, perceived enjoyment, cognitive trust, affective trust, and urge to buy impulsively). All hypotheses are supported, all path coefficients are statistically significant, the visual appeal has a significant impact on perceived usefulness, and the path coefficient is 0.432 (support H1b). Visual appeal and feasibility have essential effects on perceived enjoyment, with path coefficients of 0.156 and 0.312 (respectively supporting H1a and H2). Speciality and similarity have a positive impact on cognitive trust, with path coefficients of 0.176 and 0.322 (respectively support H6 and H5a). Similarity has a positive effect on affective trust, with a path coefficient of 0.347 (supporting H5b). Perceived usefulness has a significant impact on perceived enjoyment, with a path coefficient of 0.286 (supports H3). Cognitive trust has a positive effect on affective trust with a path coefficient of 0.128 (supporting H4). Both perceived enjoyment and affective trust have an essential impact on impulse purchases, with path coefficients of 0.083 and 0.432 (supportH7 and H8). In addition, income (0.037ns) and occupation (0.063ns) in the control variables are irrelevant, but the effects of age, consumer impulses, and the degree of trust on the platform are significant.

6. CONCLUSIONS AND DISCUSSION

6.1 Contribution

This research is based on the S-O-R model and impulse buying theory. The model includes internal variables of the recommender and the product itself to facilitate testing the relationship between third-party product recommendation and impulse purchase behavior. We come to a conclusion and make the following recommendations.

First, the stimuli (visual appeal and feasibility) associated with recommended products have a positive impact on the perceived usefulness and perceived enjoyment. And perceived enjoyment will significantly affect the urge to buy impulsively. In other words, if the product information recommended by a third-party recommender has excellent appearance characteristics (such as vivid videos, exciting pictures, and fascinating stories, etc.) and feasibility (such as the presentee feels that the product is suitable for him), then It will make the presentee has a sense of enjoyment so that the presentee will have the urge to buy impulsively.

Second, the stimuli (speciality and similarity) associated with the recommender have a positive impact on the cognitive trust and affective trust of the presentee's body. In other words, if the third-party recommender provides accurate, correct, and appropriate recommendation information, the referee will cognitively trust the third-party recommender. And it is found that when the recommender finds similar to the third-party recommender (has a common experience, similar values, etc.), the presentee will not only trust the recommender cognitively but also have an emotional impact on the recommender. Trust. And this kind of psychological

stimulation will make the referees have the urge to buy impulsively.

Finally, the results of this study provide valuable guidance for social business recommenders on how to build trust, effectively present recommended content, and promote consumers to purchase recommended products.

6.2 Management Implications

The third-party recommender should consider the visual appeal and applicability of the product when recommending the product and should devote more resources to the design to build an accurate, relevant and up-to-date product recommendation post with excellent visual effect and easy to be seen by the recommender. This will make referrer feel useful and, at the same time, enhance their perception to get perceptual enjoyment.

Third-party recommenders should be as professional and accurate as possible when designing and writing recommended posts. This will give referees cognitive trust. In addition, you should add some relevant information about yourself, such as some of your own experiences and your own values, so that the referees feel similar to themselves. This allows the referees to trust themselves not only cognitively but also emotionally. Create trust.

Businesses do not have to rely on the official for advertising and promotion. Influential people on these social commerce platforms can be used for advertising and promotion. This kind of development is imperceptible. Consumers will not feel that they are advertising, and their alertness will be greatly reduced. The effect of this promotion is often much better than direct advertising, and the time and money spent will be reduced. These saved costs can be used to improve their products, enhance consumers' shopping experience, and increase profits.

6.3 research limitations and future research

Our research model includes the important factors that product recommendations influence impulse purchases, and further exploration is needed to determine the extent to which these factors change consumers' impulse buying behavior. Other environmental factors can also be explored in future research. In addition, depending on the recommendation platform, product type, and recommendation form, different recommendation behaviors may lead to different results. Therefore, different platforms and forms of advice can be used for analysis to understand online impulse buying behavior better. The subjects we studied were between 21 and 30 years old. We suggest that future research should sample different age groups and that the platforms we use are in China, and the results of this research cannot be extended abroad.

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