

Article

Impulse Buying Behaviors in Live Streaming Commerce Based on the Stimulus-Organism-Response Framework

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Abstract: Live streaming commerce, which evolved from social commerce, has continued to flourish rapidly over the past few years in China. It is a new business model that allows vendors to directly face and interact with consumers. This study focuses on the impulsive buying behavior on consumers in live streaming commerce. We proposed a research model based on the stimulus organism response (S-O-R) framework to explore the reaction and behavior of consumers after certain stimuli factors. A total of 433 valid sample questionnaires with the shopping experience in the live streaming platform were taken. This research adopted PLS-SEM statistical analysis as an empirical research evaluation. After the empirical investigation, we found that perceived enjoyment positively affects the urge to buy impulsively. Perceived usefulness positively affects perceived enjoyment. However, perceived usefulness does not positively affect the urge to buy impulsively. Attractiveness and expertise positively affect perceived enjoyment. Product usefulness and purchase convenience positively affect perceived usefulness. We found that consumers in live streaming commerce are easier to have impulsive buying through the presentation and urging of the live streamer in a short period. In this paper, we build a model for impulsive buying in live streaming commerce. We verify this model under the Chinese context. The findings of this paper provide concrete suggestions to vendors.

Keywords: impulse buying; influence marketing; live streamer; live streaming commerce



Citation: Lee, C.-H.; Chen, C.-W. Impulse Buying Behaviors in Live Streaming Commerce Based on the Stimulus-Organism-Response Framework. *Information* **2021**, *12*, 241. <https://doi.org/10.3390/info12060241>

Academic Editors: Umair Akram, Jiayin Qi and Nada Trunk Širca

Received: 18 May 2021

Accepted: 6 June 2021

Published: 8 June 2021

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1. Introduction

With the advancement of Internet technology, online shopping has long been upgraded from text and pictures to multimedia. Social commerce has become an indispensable part of E-commerce. Further, under the popularity of live streaming, some vendors on social commerce platforms began to adopt live streaming as a tool to E-commerce in China. This has led to the emergence of a new model of social commerce called live streaming commerce [1].

The 47th China Statistical Report on Internet Development [2] released by the China Internet Network Information Center pointed out that as of December 2020, China's online shopping users had reached 782 million, with a utilization rate of 79.1%. Live streaming commerce has become a new trend of E-commerce. This new business model began in 2015 and bloomed in 2019. Accords to CNNIC [2], live streaming commerce had become the fastest-growing in E-commerce. Live stream users had reached 617 million and live streaming commerce users had reached 388 million in 2020. Under the Chinese Government's policy of increasing the domestic consumer market, live streaming commerce will become one of the mainstreams of E-commerce.

Live streaming commerce is carried out in real-time and highly interactive with consumers. Live streamers show off the appearance, function, and any related introduction of the product. Consumers may ask product price, shipping, and other questions. Live streamers can respond based on the live content, which can affect consumers' behavior. Then they click on an embedded link provided by the vendors to complete the purchasing [3,4].

Live streaming commerce can take place in three types: (1) live streaming platforms incorporating commercial activities (e.g., TIK TOK), (2) E-commerce sites, marketplaces (e.g., T-mall), or mobile app integrating live streaming features, and (3) social networking sites (SNSs) that add live streaming features (e.g., Facebook Live) to facilitate selling [5]. Compared with traditional e-commerce, live streaming commerce has significant advantages in product presentation, time cost, shopping experience, and sales logic [6]. Live streaming commerce is not only an important channel for vendors, it is a new business model that allows vendors to directly face and interact with consumers.

Researchers began to pay attention to the theoretical and practical impact of live streaming commerce. However, the business model of live streaming commerce is just emerging. There are only a few research papers related to live streaming commerce. We can only find similar research topics from live streaming and social commerce. Live stream commerce was especially effective on the millennium generation (i.e., consumers born between 1982 and 2000), who are comfortable using social media to search for new products [7]. However, this was based on luxury brands and for Brazilian and Italian consumers. Sun et al. [1] argued that visibility affordance, metavoicing affordance, and guidance shopping affordance can influence consumer purchase intention. This was to study purchase intention from the perspective of IT people. Li et al. [6] believed that user stickiness is an important factor in the development of live streaming commerce platforms. They found that technical factors and social factors positively affect emotional attachment to streamers and platform attachment respectively. However, the product factors were not considered. Liu et al. [4] suggested that live streamers' authenticity, attitudinal similarity, and consumer response capability enhance intimacy and consumer engagement. They put the live streamers as a key factor. Wu et al. [8] confirmed the celebrity effects and found the existence of lurker situations in live streaming commerce. Yin [9] argued that perceived ease of use, situational factors, and follow others' behavior significantly impact purchase intention. Perceived usefulness of influence on purchase intention is lesser. Hu and Chaudhry [10] adopted various relational bonds, affective commitment, and customer engagement to find relationships and create consumer loyalty in live streaming commerce. They found that social and structural bonds positively affect consumer engagement directly and indirectly via affective commitment.

Since live streaming commerce is a new social commerce model that just emerging. At present, there are few relevant studies, and it is found from the above research that scholars mostly believe that the main influencing factor of live streaming is the charm of live streamers. It gave us research thought to study consumer behaviors. Is it because the perceived usefulness of the product or the perceived enjoyment of the live streamers promotes consumers' impulse purchases in the live streaming commerce? We need more study to understand the behaviors of consumers on live streaming commerce. This research adopts the S-O-R (stimulus-organism-response) framework to study consumer behavior on live streaming commerce. Citing previous E-commerce literature, we introduce the situation factors as a stimulus that affects customers' cognitive and affective perceptions. In this study, we adopt attractiveness, trustworthiness, and expertise to perceive enjoyment (affective reaction). We adopt product usefulness, purchase convenience, and product price to perceive usefulness (cognitive reaction). Further, we take the urge to buy impulsively as a response to investigate the final impulse buying behavior. We adopted the uses of data sciences analysis in digital marketing research [11], tracking and predicting consumer behavior on digital channels. It can be used to formulate new hypotheses that need to be addressed. From the building model, this study has been examined and investigated to provide a better understanding of consumers' purchasing behaviors.

In this context, the present study pursues the following two objectives:

- We aim to study the key factors that promote consumers' impulsive buying behavior in live streaming commerce.

- We intend to introduce the theoretical framework and concepts of S-O-R in the research of live streaming commerce to improve the understanding from a theoretical and a practical overview.

The originality of this research lies in our applies the S-O-R framework in live streaming commerce, which, to the best of our knowledge, has not been thoroughly developed. This study contributes to establishing a stronger theoretical model from live streaming commerce. We verify the validity of this model under the Chinese context. Then, this study provides practical guidelines for live streamers and vendors to increase their engagement commerce with their consumers.

The remainder of this research is structured as follows. Section 2 presents the literature summary and the theoretical framework of the study. We present the research method in Section 3. The results are reported in Section 4. Finally, we propose our conclusions and recommendations in Section 5.

2. Literature Review

2.1. Live Streaming Commerce

Live streaming commerce is an advancement of e-commerce embedded with real-time social interaction [12]. Live streaming commerce performs E-commerce activities and transactions under a live streaming platform.

It involves a live streaming platform that includes live streaming technology and infrastructure to provide a virtual environment that provides real-time interaction, entertainment, social activities, and commerce. In such an environment, the live streaming space creates a virtual space for live streamers to stream and provides viewers a channel to watch and interact with a live streamer [13]. A live streamer usually has sizeable people to follow on some live stream platform. Live streamers are content creators who accumulate solid followers [13,14].

In general, a typical live streaming activity for selling products involves a live streamer demonstrating different perspectives of the products and encouraging the audience to purchase them [5,15]. Interactivity is a key characteristic of the live streaming commerce environment, fosters users' active attitudes and behaviors in communications and transactions [16].

Live streaming commerce not only provides viewers with a real-time viewing experience to obtain product information but also provides opportunities for communication and social interaction between a live streamer and viewers [5]. Such interactions may promote the development of users' attachment [6].

Thus, live streaming commerce refers to the marketing behavior that the live streamer uses computers, mobile phones, and other network terminals to promote products in live streaming, and then provides shopping links to facilitate transactions in a short time. Live streaming commerce not only enables consumers to experience shopping benefits but also assists in developing virtual social relationships with live streamers during real-time interactions [10,17]. Live streaming commerce is a novel shopping environment that provides multiple stimuli to motivate potential consumers to indulge in their shopping behaviors [1,13]. In this study, we define that live streaming commerce as a live streamer promoting or selling products on a certain live stream platform.

2.2. Urge to Buy Impulsively

Impulse buying is described as a sudden, unplanned, compelling, and hedonic purchasing behavior [18,19] that lacks deliberate consideration of all available information and alternatives [20]. Applebaum [21] proposed impulse buying that is not planned by the consumer before entering a store, but which results in purchasing behavior from a stimulus created by the store. Impulse buying can be characterized as a lack of rational judgment and being dominated by emotions [22]. Impulsive buying is driven by consumers' emotions, spontaneous behavior, or low cognitive control, and that behavior is driven by appealing objects, which trigger impulse buying among shoppers without considering financial and

other aspects in the E-commerce era [23]. Most research in the past has focused on how website interfaces can affect online impulse buying behavior [24,25]. There are many factors related to shopping that will lead to impulsive buying, not just website interfaces. For example, factors like price attributes, visual appeal, social influence, and vendor creativity result in impulsive buying decisions [26]. Parboteeah et al. [20] found that consumers are more likely to have impulse buying if they perceive enjoyment when interacting with the shopping environment. E-commerce has gradually evolved into social commerce. Consumers are increasingly exposed to information and social interactions on social media, making the influence of purchase stimuli stronger and leading to impulse buying [27,28]. Influencer marketing becomes one of the major streams in social commerce by introducing products to their audience [29,30]. Under this development trend, vendors continued to study how to stimulate consumers to buy impulsively. Therefore, live streaming commerce was born.

Impulsive buying behavior is derived from an urge. Urge to buy impulsively (UBI) is one of the types of unplanned emotion. This means, when individuals buy products, people do not think exhaustively about the need for the products [31]. UBI is a leading intention of actual consumers' impulse buying behavior because consumers' UBI leads to actual impulse buying [32].

From the above, this study focused on consumer urge to buy impulsively. Some researchers had already focused on UBI in E-commerce or even in the SNS context [28,33]. However, our study focuses on live streaming commerce with the incorporation of impulsive behavior and the interactions between live streamers and their consumers.

2.3. S-O-R Framework

The S-O-R models an environmental stimulus that affects an individual's cognitive and affective responses, which is applied to study consumers' behavior from different retail stimuli, which are mediated by an organism, also known as emotional reactions [34,35]. Donovan and Rossiter [36] introduced the S-O-R framework to study an individual's perceptions and behavior as a response to external stimuli for retail and environmental psychology. Stimuli include factors outside an individual's control, which affect the internal states of organisms when exposed to external stimuli. Organism acts as a bridge for connecting stimulus and behavior, and an organism regulates the final behavior in response to the stimulus [37]. The response is a summary factor in response to results for an organism's regulation. Today, the S-O-R approach not only provides a traditional basis for consumer behavior study but also helps to study the E-commerce shopping experience. We will explain the S-O-R framework in detail.

Stimulus refers to the triggers that induce individuals' perceptions and then influence their response [19,20]. The stimulus was defined as factors particular to a time and place of observation that do not follow from knowledge of personal and stimulus attributes and which have a demonstrable and systematic effect on current behavior [38]. In live streaming commerce, we view the situation factor as a stimulus that affects customers' cognitive and affective perceptions. Live streaming commerce has integrated commerce, social activities, and situation factors in a seamless way. Most live streamers have developed a reputation as a credible source that has attracted followers. Attractiveness is a cognizable factor. Lots of followers are attracted to the products or the brands endorsed by the live streamers [13]. Highly trustworthy influencers can produce an effective attitude toward brand credibility and purchase intentions [39]. The perceived trustworthiness of the influencer affects consumer engagement [40]. Trustworthiness can be regarded as a situation factor. Expertise is a high level of skill or knowledge that can be a stimulus for consumers. In influencer marketing, Xiang et al. [28] defined expertise as the extent to which users on a social commerce platform are perceived that they can find members who post instructive consumption information and are professional in some aspects. Consumers are more likely to interact with other users who are knowledgeable about brands and products. Product usefulness is defined as the consumers' perception that a product or

service provides a benefit that fulfills their needs. Product usefulness can increase the market size [41]. Consumers will be attracted by products' usefulness and make the purchase decision rapidly to satisfy their desires [42]. Purchase convenience means that consumers spend less time and effort in online shopping [43]. Lin and Lo [44] found that the convenience of purchase environments markedly impacts the consumers' positive affect. Therefore, the more convenient the purchase interfaces, the more likely are consumers to buy. Price attribute is one of the main reasons for participating in online shopping [45]. Product price refers to the promotional strategy in which vendors lower the retail cost of certain items to attract consumers. The greater the discount or the more convincing the sales personnel and experts sound, the more likely consumers will be to purchase on impulse [46]. Consumers place orders in live streaming because they think live streaming commerce offers a cheaper price.

The organism is an internal state of an individual which is represented by affective and cognitive states. It is also regarded as an intermediary state between the stimulus and responses [47]. Internal individual psychological status can be divided into cognitive reactions and affective reactions [19]. The cognitive reaction is a process of dealing with the existing information [48]. The affective reaction reflects individuals' feelings or emotions like satisfaction and happiness [49]. Chen and Yao [50] refer to impulsiveness as a psychological organism that directly seeks a response and indicate that the consumers with impulse buying tendency are more likely to have impulse buying behaviors than others. In this study, we adopt perceived usefulness (cognitive reaction), perceived enjoyment (affective reaction), an urge to buy impulsively as organism variables to investigate the final impulse buying behavior.

Response refers to the outcome of consumers' reactions toward the impulse buying stimuli and their internal evaluations [19]. The reaction is the response to their perceptions based on the different situation factors [20]. In the process of impulse buying, the response has two aspects, namely, the urge to buy impulsively and the actual impulse buying behavior [28]. Previous studies adopted the urge to buy impulsively rather than actual impulse purchases to do the research [51–53]. This study also adopts the urge to buy impulsively to measure individuals' impulsivity rather than using impulse buying behavior on live streaming commerce.

2.4. Proposed Model and Development of Hypotheses

Based on the S-O-R approach, attractiveness, trustworthiness, expertise, product usefulness, purchase convenience, and product price will affect the urge to buy impulsively through perceived enjoyment and perceived usefulness. All hypotheses from our model were developed and presented as follows.

Live streamers play the role of a representative or "endorser" of the product or brand in live streaming commerce. Bergkvist and Zhou [54] indicated that celebrity endorsements can exert positive impacts on people's good impression of a promoted item. This enhances the consumers' cognitive assimilation, due to the association between a brand and an attractive streamer [13]. Therefore, this study postulates the following hypotheses:

Hypothesis 1 (H1). *Attractiveness affects perceived enjoyment positively.*

Lou and Yuan [29] argued that the perceived informativeness value of influencer generated will affect costumers' trust. Park and Lin [55] proved that the trustworthiness of influencers relates positively to the purchase intention of the endorsed product. Thus, there is a causal relationship between trustworthiness and affected by live streamers. This study made the following hypothesis:

Hypothesis 2 (H2). *Trustworthiness affects perceived enjoyment positively.*

A social media influencer is first and foremost a content generator: one who has a status of expertise in a specific area, who has cultivated a sizable number of captive

followers by regularly producing valuable content via social media [29]. Consumers are more likely to interact with other users who are experts about brands and products. Therefore, this study postulates the following hypotheses:

Hypothesis 3 (H3). *Expertise affects perceived enjoyment positively.*

When users perceive utilitarian value from the use of social commerce sites, for example, users could feel that the products are good value for money, they are more likely to generate satisfaction toward the sites [56]. Self-product fit relates positively to purchase intention [55]. Therefore, this study postulates the following hypotheses:

Hypothesis 4 (H4). *Product usefulness affects perceived usefulness positively.*

Purchase convenience is another important aspect of E-commerce quality. Impulse buying behavior is affected by the convenience with which the system can be operated and purchases can be made [50]. The more convenient the purchase interfaces, the more likely are consumers to buy. Therefore, there is a causal relationship between purchase convenience and affected byproducts. This study made the following hypothesis:

Hypothesis 5 (H5). *Purchase convenience affects perceived usefulness positively.*

Yu et al. [57] found that the price attribute will positively affect consumer behaviors. Zhu et al. [58] pointed out that price advantage positively influences the usefulness of cross-buying. Consumers give positive feedback and yield to impulse buying when offered discount prices on products [50]. Lee et al. [59] also proposed that product price attribute affects perceived usefulness positively. Therefore, this study made the following hypothesis:

Hypothesis 6 (H6). *Product price has a positive effect on affected by products.*

Perceived usefulness is defined as the degree to which the consumers believe that their shopping efficiency will be enhanced by utilizing specific ways [20]. Perceived usefulness of product information available on E-commerce is considered an important precursor towards costumers' buying behavior [60,61]. Impulse buying is the purchase behavior that has not been arranged beforehand and is driven by the intention to buy immediately. Wu et al. [62] argued that the occurrence of impulse buying in customers is highly relative to perceived usefulness. Therefore, this study made the following hypothesis:

Hypothesis 7 (H7). *Perceived usefulness affects the urge to buy impulsively.*

Holbrook and Batra [63] argued that cognition determines the effect, which results in behavior. Development of cognition will be induced based on individual understanding of stimulation, resulting in response for affective reactions [64]. Zhou and Feng [65] proposed that perceived usefulness would have a positive influence on the perceived enjoyment of video calling usage. According to prior research, the following hypothesis:

Hypothesis 8 (H8). *Perceived usefulness affects perceived enjoyment positively.*

Positive affect is the main driver of impulse buying behavior [22]. Shen and Khalifa [66] found that positive effects such as pleasure and arousal have significant positive effects on the urge to buy impulsively. Those related studies showed that perceived enjoyment may have a positive effect on consumers' impulse buying intention, and promote consumers to produce impulse buying behavior. Xiang et al. [28] showed that consumers' perceived enjoyment of a social commerce platform positively affects their urge to buy impulsively. Therefore, we propose the following hypothesis:

Hypothesis 9 (H9). *Perceived enjoyment affects the urge to buy impulsively.*

The research model is shown in Figure 1.

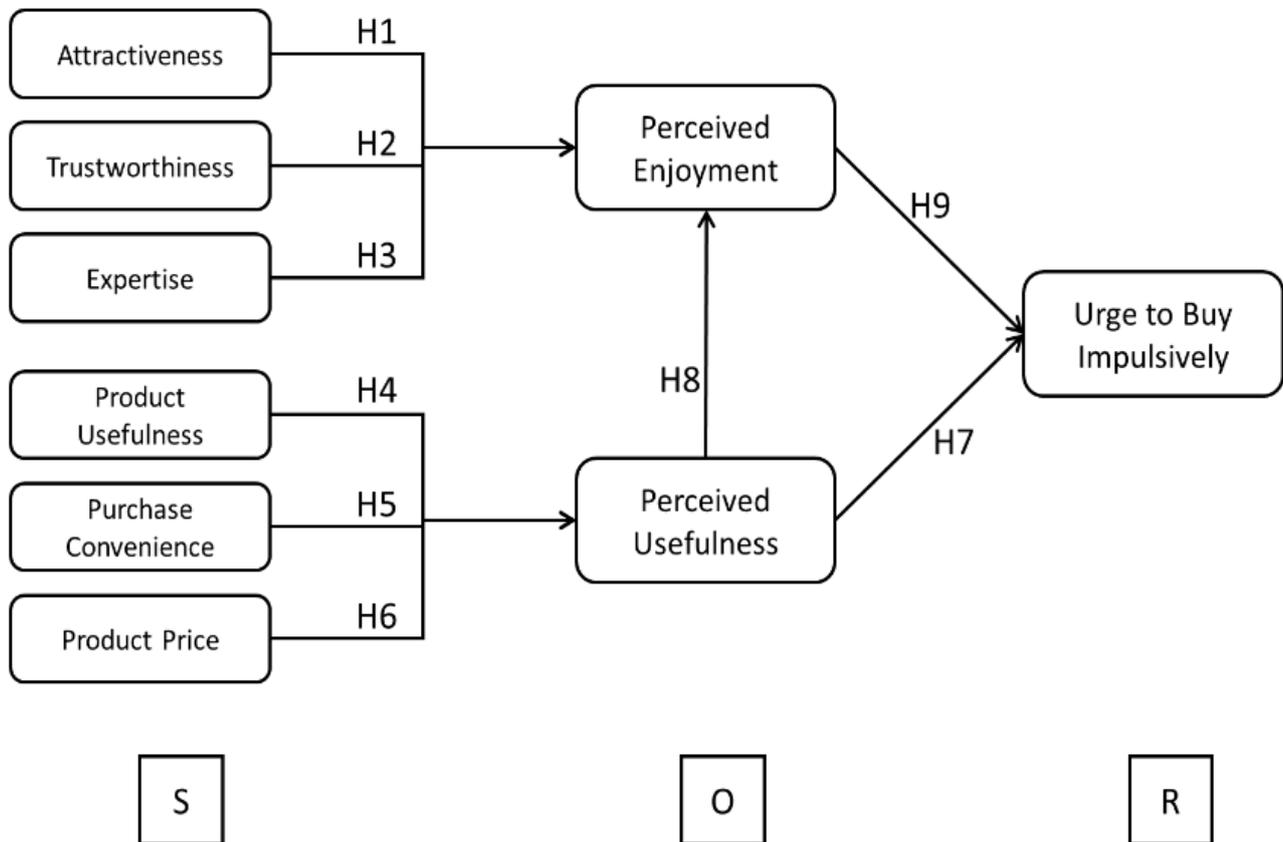


Figure 1. The Live Streaming Commerce Impulse Buying Model.

3. Research Method

The hypothesis is shown in Figure 1. We adopted the partial least squares (PLS) method to execute data analysis. The psychometric properties of the constructs (i.e., validity and reliability) together with relationships between the constructs in the research model were examined simultaneously [67]. Compared with the covariance-based structural equation model, PLS is variance-based and suitable for predictive applications and theory building. There are two steps to test the goodness of model fit. First, the measurement model was tested using a confirmatory factor analysis (CFA) to assess the discriminant and convergent validity. Structural model analysis was performed to test the significance of the path coefficients and validate the hypothesis of the research hypothesis.

The questionnaire was developed in English and then translated into Mandarin for the respondents. All measurement items were identified from previous literature with minor modifications to fit the context of live streaming commerce. The questionnaire was designed with a five-point Likert scale. Upon completion of the questionnaire design, five target subjects were first asked to fill out the questionnaire, and the semantic understanding of the questionnaire content was tested and revised to improve its readability. After that, another 15 target subjects were invited for a pre-test to confirm the questionnaire quality and response results. Finally, example verification was carried out.

This study conducted the questionnaire survey from 1 March to 10 March 2021. The questionnaire adopted Tencent questionnaire platform and conducted a questionnaire survey on WeChat. The questionnaire was put into Beijing, Shanghai, Guangzhou, and Shenzhen four major cities in China. Only those with live streaming commerce experience

could answer the questionnaires. One WeChat ID could only fill in one questionnaire to ensure they were answered by valid users. A total of 433 valid samples were collected.

All measurement items were identified from previous literature with minor modifications to fit the context of live streaming commerce. The measurements of the urge to buy impulsively adopted and amended by Lee et al. [59], Chen et al. [68], Chen and Yao [50], and Xiang et al. [28]. The measurements of perceived enjoyment adopted and amended from Parboteeah et al. [20], Xiang et al. [28], Parboteeah et al. [69], and Lee et al. [59]. The measurements of perceived enjoyment adopted and amended from Parboteeah et al. [20], Xiang et al. [28], Parboteeah et al. [69], Zhang et al. [70], and Lee et al. [59]. Other questionnaire items can be found in Appendix A. The descriptive statistics are shown in Table 1.

Table 1. Demographic statistics ($n = 433$).

Characteristics	Freq.	Percent (%)	Characteristics	Freq.	Percent (%)
Gender			Year of Birth		
Female	274	63.3	Before 1979	26	6.0
Male	159	36.7	1980~1994	98	22.6
Education			After 1995	309	71.4
High school or below	57	13.2	Job tenure		
Junior college	96	22.2	≤2	253	58.4
University	234	54.0	2 < & ≤ 5	102	23.6
Graduate school or above	46	10.6	5 < & ≤ 10	49	11.3
Monthly Income			>10	29	6.7
below 3000	168	38.8	Frequency of Shopping		
3000~8000	200	46.2	Several Times	317	73.2
8000~15,000	55	12.7	Once per Month	76	17.6
above 15,000	10	2.3	Once per Week	40	9.2

4. Research Results

4.1. Assessment of the Measurement Model

We adopted the partial least squares (PLS) method to execute data analysis, which allows researchers to specify the relationships among the factors of conceptual interest and the measures underlying each construct, and PLS does not have rigorous restrictions on variable distributions.

This study conducted a two-step approach to conduct data analysis. First, we used confirmation factor analysis (CFA) to assess the reliability and construct validity. Second, we used the structural equation model analysis to empirically test the research hypothesis. We assessed the composite reliabilities (CR) of all constructs to evaluate construct reliability. In Table 2, the Cronbach's alpha of all constructs is above 0.7 and exceeds the threshold values suggested by Fornell and Larcker [71] and Hair et al. [72], indicating that the proposed model measures possess sufficient construct reliability. Table 2 showed that the standardized factor loadings for different measurement items are above 0.70 and AVEs for all constructs are above 0.50 (range from 0.654 to 0.852). Discriminant validity was assessed by comparing the squared root of the AVEs of each construct with the correlations between the constructs. These suggest that the proposed model possesses sufficient convergent validity [72]. Moreover, the results presented in Table 3 demonstrate satisfactory discriminant validity. The squared root values of the AVEs for constructs were greater than the correlations between constructs, which means that all of the constructs differ from each other [73]. We collected independent and dependent data from the same source by using the same method; common method variance (CMV) was deemed a potential concern in this study. Therefore, we adopt the Harman single factor test to test for method bias following the guidelines of Podsakoff et al. [74], the results show that several

factors have eigenvalues greater than a and a total explained variance less than 50%, which represents there is no method bias problem.

Table 2. Construct on reliability and validity.

Constructs	Items	Loadings	t-Value	Average Variance Extracted	Composite Reliability	Cronbach's Alpha
Attractiveness	ATT1	0.819	30.263	0.692	0.918	0.889
	ATT2	0.862	47.632			
	ATT3	0.838	31.463			
	ATT4	0.836	28.296			
	ATT5	0.803	26.050			
Trustworthiness	TRU1	0.904	56.284	0.852	0.959	0.942
	TRU2	0.933	91.795			
	TRU3	0.948	100.915			
	TRU4	0.906	59.651			
Expertise	EXP1	0.868	40.614	0.738	0.918	0.882
	EXP2	0.887	42.246			
	EXP3	0.866	35.235			
	EXP4	0.814	34.300			
Product Usefulness	PU1	0.779	22.090	0.680	0.864	0.764
	PU2	0.810	22.467			
	PU3	0.881	52.449			
Purchase Convenience	PC1	0.842	33.863	0.681	0.914	0.880
	PC2	0.867	37.635			
	PC3	0.891	53.574			
	PC4	0.865	13.849			
	PC5	0.843	39.030			
Product Price	PP1	0.877	51.842	0.810	0.928	0.883
	PP2	0.906	45.963			
	PP3	0.917	72.468			
Perceived Enjoyment	PerE1	0.847	38.982	0.745	0.936	0.914
	PerE2	0.874	51.464			
	PerE3	0.872	41.040			
	PerE4	0.866	44.097			
	PerE5	0.857	34.998			
Perceived Usefulness	PerU1	0.844	29.692	0.752	0.938	0.917
	PerU2	0.844	35.465			
	PerU3	0.899	48.894			
	PerU4	0.890	45.383			
	PerU5	0.857	37.480			
Urge to Buy Impulsively	IB1	0.732	16.198	0.654	0.904	0.867
	IB2	0.862	44.282			
	IB3	0.872	43.862			
	IB4	0.813	28.532			
	IB5	0.754	19.975			

Table 3. Discriminant validity.

	ATT	TRU	EXP	PU	PC	PP	PerE	PerU	UBI
Attractiveness(ATT)	0.832								
Trustworthiness(TRU)	0.733	0.923							
Expertise(EXP)	0.682	0.763	0.859						
Product Usefulness(PU)	0.596	0.583	0.579	0.825					
Purchase Convenience(PC)	0.522	0.418	0.505	0.555	0.825				
Product Price(PP)	0.566	0.560	0.546	0.640	0.579	0.900			
Perceived Enjoyment(PerE)	0.691	0.623	0.658	0.596	0.570	0.619	0.863		
Perceived Usefulness(PerU)	0.638	0.530	0.594	0.633	0.603	0.609	0.783	0.867	
Urge to Buy Impulsively(UBI)	0.516	0.501	0.505	0.450	0.424	0.410	0.662	0.563	0.809

Note: Diagonal elements (in bold) are the square root values of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs; ATT = attractiveness; TRU = trustworthiness; EXP = expertise; PU = product usefulness; PC = purchase convenience; PP = product price; PerE = perceived enjoyment; PerU = perceived usefulness; UBI = urge to buy impulsively.

4.2. Analysis of the Structural Model

The study conducts SmartPLS for testing the structural model where different research hypotheses are examined based on both magnitudes as well as the significance level of the structural path.

The results of the structural path analysis are presented in Table 4 and Figure 2. The structural model suggests that attractiveness (path coefficient = 0.423, $p < 0.001$) is positively related to perceived enjoyment (H1 is supported). Trustworthiness (path coefficient = 0.074) is not related to perceived enjoyment (H2 is not supported). Expertise (path coefficient = 0.313, $p < 0.01$) is positively related to perceived enjoyment (H3 is supported). Product usefulness (path coefficient = 0.178, $p < 0.05$) is positively related to perceived usefulness (H4 is supported). Purchase convenience (path coefficient = 0.152, $p < 0.05$) is positively related to perceived usefulness (H5 is supported). Product price (path coefficient = 0.068) is not related to perceived usefulness (H6 is not supported). Perceived usefulness (path coefficient = 0.117) is not related to the urge to buy impulsively (H7 is not supported). Perceived usefulness (path coefficient = 0.548, $p < 0.001$) is positively related to perceived enjoyment (H8 is supported). Perceived enjoyment (path coefficient = 0.570, $p < 0.001$) is positively related to the urge to buy impulsively (H9 is supported).

Table 4. Test of hypothesized relationships.

	Path Coefficient	t Value	Result
H1: Attractiveness → Perceived Enjoyment	0.423	5.617 ***	support
H2: Trustworthiness → Perceived Enjoyment	0.074	0.951	not support
H3: Expertise → Perceived Enjoyment	0.313	4.139 ***	support
H4: Product Usefulness → Perceived Usefulness	0.178	2.434 *	support
H5: Purchase Convenience → Perceived Usefulness	0.152	2.403 *	support
H6: Product Price → Perceived Usefulness	0.068	0.968	not support
H7: Perceived Usefulness → Urge to Buy Impulsively	0.117	1.104	not support
H8: Perceived Usefulness → Perceived Enjoyment	0.548	6.953 ***	support
H9: Perceived Enjoyment → Urge to Buy Impulsively	0.570	6.144 ***	support

Note: * denotes $p < 0.05$; ** denotes $p < 0.01$; *** denotes $p < 0.001$.

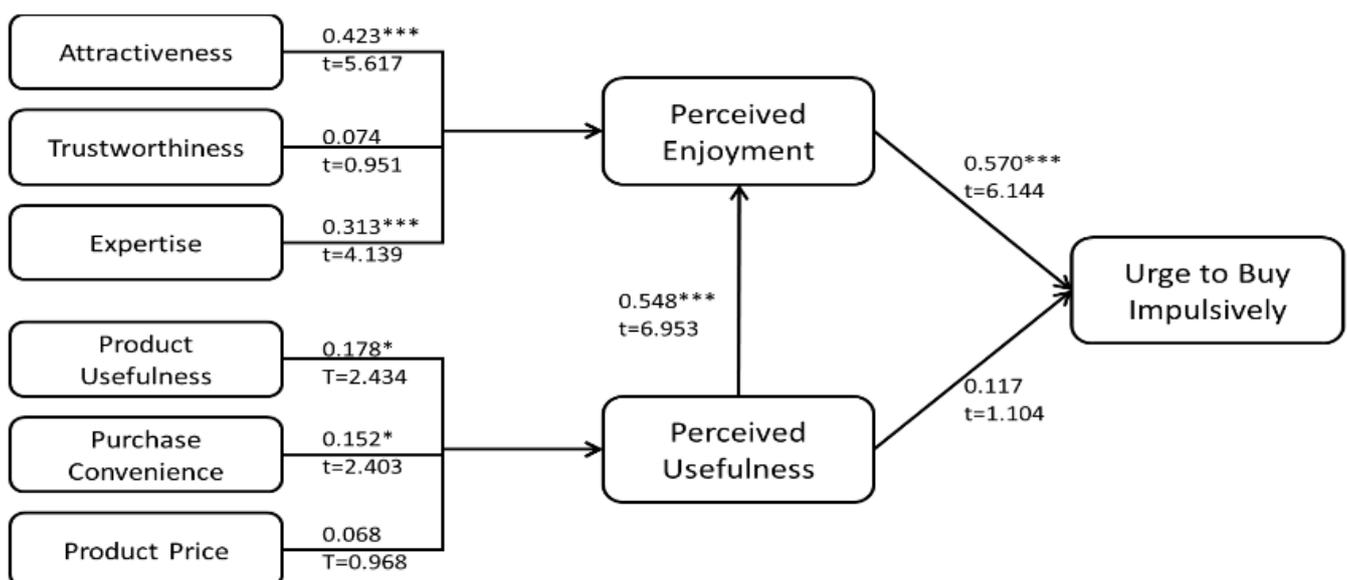


Figure 2. The results of the hypothesis test (** $p < 0.001$, * $p < 0.01$, * $p < 0.05$).

The R^2 value refers to the percentage with which the exogenous variables explain the variation in the endogenous variables, which is used as an indicator of the overall

predictive power of the model. Falk and Miller [75] recommended that the value of R^2 for exogenous variables should be more than 0.10 to be statistically viable. Figure 2 shows the path coefficients between the exogenous and endogenous variables for the model of female samples, as well as the R^2 and path coefficient. As shown in Figure 2, the explained variance is 54.4% for perceived enjoyment, 67.4% for perceived usefulness, and 44.3% for the urge to buy impulsively.

5. Conclusions

This study was motivated by the prosperity of live streaming commerce. We intend to explore consumer impulse buying behavior. Through literature review on social commerce, live streaming, and live streaming commerce, we have comprehensively organized the influence factors on consumer behavior in live streaming commerce, including attractiveness, trustworthiness, expertise, product usefulness, purchase convenience, and product price. By adopting the S-O-R framework, perceived enjoyment and perceived usefulness were identified as the consumers' cognitive state and emotional state. The urge to buy impulsively is the response behavior. We propose the live streaming commerce impulse buying model.

We then conducted an empirical investigation by tracking and predicting consumer behavior on digital channels to test our hypotheses. Under the Chinese context, a total of 433 valid sample questionnaires with the shopping experience in the live streaming platform were taken. We adopted PLS-SEM statistical analysis as an empirical research evaluation.

5.1. Conclusions

The results of our analysis showed that perceived enjoyment positively affects the urge to buy impulsively. Perceived usefulness positively affects perceived enjoyment. However, perceived usefulness does not positively affect the urge to buy impulsively. Attractiveness and expertise positively affect perceived enjoyment. Product usefulness and purchase convenience positively affect perceived usefulness.

Live streaming commerce is still an emerging social commerce business. We tried to find similar to our research model of related literature for comparison. Yin [9] found that perceived usefulness of influence on purchase intention was lesser. This is similar to our finding. However, he did not focus on perceived enjoyment. Cai and Wohn [12] adopted utilitarian and hedonic motivations for live streaming commerce. They found that hedonic motivation is positively related to celebrity-based intention and utilitarian motivation is positively related to product-based intention. This inference is similar to our study in affective reaction and cognitive reaction.

The results of the empirical investigation show support for our proposed research model. However, there are still several unexpected observations. Attractiveness and expertise affect perceived enjoyment positively. The findings confirm that those factors influence the consumers' emotional state. Product usefulness and purchase convenience affect perceived usefulness positively. The findings confirm that those factors influence the consumers' cognitive state. However, the results exclude trustworthiness and product price as the stimuli factors.

Trustworthiness positively affects consumers' value in the context of social commerce [76]. The prosperity of live streaming commerce also brings sequelae. To attract suppliers and consumers, live streamers might release false information, including followers, online viewers, likes, and transaction volumes. Some consumers have transaction disputes include fake goods, quality issues, and other problems after the purchases. Those problems reduce consumer trust in live stream commerce. Different consumers have different concerns in E-commerce. Hu and Chaudhry [10] found that financial bonds have only an indirect effect on live streaming commerce. This is also similar to our finding.

Perceived usefulness affects perceived enjoyment positively. Perceived enjoyment affects the urge to buy impulsively. These verify our model. However, perceived usefulness does not directly affect the urge to buy impulsively. In live streaming commerce, the major

problem might come from consumers' impulse buying. Akram et al. [23] argued that impulsive buying is driven without considering financial and other aspects in the E-commerce era. Live streaming commerce is easier to buy impulsively through the presentation and urging of the live streamer in a short period.

5.2. Implications for Research

The results of this study have theoretical implications for future research. First, we explain the factors that influence the urge to buy impulsively from customers who have purchase experience on the live streaming platform. Live streaming commerce is a new social commerce model that just emerging. There are still few relevant studies. Currently, most scholars believe that the main influencing factor of live streaming is the charm of live streamers [1,5,6,13,16]. Our results show that both live streamer and product-related can influence customer purchase intention in live streaming commerce. Our study provides a theoretical basis for future studies.

Second, this study contributes a novel research model that is based on the S-O-R framework and establishes a theoretically grounded link between perception and customer urge to buy impulsively in the context of live streaming commerce. The results show that perceived enjoyment positively affects the urge to buy impulsively. Perceived usefulness positively affects perceived enjoyment. However, perceived usefulness does not positively affect the urge to buy impulsively. Impulse buying in customers is highly relative to perceived usefulness in E-commerce [61]. Perceived usefulness would have a positive influence on the perceived enjoyment of video calling usage [63]. Consumers' perceived enjoyment of a social commerce platform positively affects their urge to buy impulsively [28]. We adopt the impact of the perceived usefulness and perceived enjoyment on the urge to buy impulsively, apply it to live streaming commerce, and form empirical investigation to test the similarities and differences.

Third, our model explores the factors that affect perceived enjoyment and perceived usefulness. After empirical investigation, we verify that attractiveness and expertise affect perceived enjoyment positively. Former literature indicated that celebrity endorsements can exert positive impacts on people's good impression of a promoted item [54]. Consumers are more likely to interact with other users who are experts about brands and products [29]. The findings confirm that those factors influence the consumers' emotional state. Product usefulness and purchase convenience affect perceived usefulness positively. When users perceive utilitarian value from the use of social commerce sites, they are more likely to generate satisfaction toward the sites [56]. The more convenient the purchase interfaces, the more likely are consumers to buy [50]. The findings confirm that those factors influence the consumers' cognitive state. However, the results exclude trustworthiness and product price as the stimuli factors.

5.3. Implications for Practice

Our research is helpful for live streaming commerce vendors. Live streaming commerce is just emerging. There are still lots of space to improve. This study has several useful findings for vendors in practice. Perceived enjoyment positively affects the urge to buy impulsively. The impulse buying of consumers is emotional behavior. Especially in live streaming commerce, live streamers are the key factor. Live streamers use their charm and skills to present the product completely in a short time, interact with consumers in real-time, and attract consumers to place orders. Live streamers shall perform sufficiently professionally and attractive. Except for attracting by the live streamers, consumers care about product usefulness and purchase convenience. However, consumers are not sensitive to the product price. Those suggestions can give some help to the vendors who want to participate in live streaming commerce.

5.4. Limitations and Future Researches

This study has its limitation. In our questionnaires, we did not limit any kind of live streaming commerce platform for the respondents. They just answered the questionnaires by their last live streaming commerce experience. However, different consumers might have different experiences in the different platforms or different products. In the future, researchers can have a comparison study, for example, different platforms, different products category, or different generations, etc. More and more online shopping platforms are emerging in different countries. We can also explore impulse buying among other countries or other cultures. We adopt a cross-sectional methodology in this study. The samples are collected and analyzed in the same period. In the future, we can adopt the actual data on a certain platform. We can use experiments and econometric models to analyze the actual causality. Adopting big data and AI, there might be found some really interesting and helpful findings.

Author Contributions: For research articles with several authors, a short paragraph specifying their contributions must be provided. Conceptualization, C.-H.L. and C.-W.C.; methodology, C.-W.C.; software, C.-H.L.; validation, C.-H.L.; formal analysis, C.-H.L.; investigation, C.-H.L.; writing—original draft preparation, C.-H.L.; supervision, C.-W.C. Both authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Attractive [55,77,78]

ATT1—The live streamer gives me a good feeling.

ATT2—The live streamer is attractive.

ATT3—The live streamer catches my attention.

ATT4—I feel the live streamer is friendly.

ATT5—I feel the live streamer is likable.

Trustworthiness [55,78,79]

TRU1—I feel the live streamer is dependable.

TRU2—I feel the live streamer is honest.

TRU3—I feel the live streamer is trustworthy.

TRU4—I feel the live streamer is sincere.

Expertise [67,78,79]

EXP1—I feel the live streamer is experienced.

EXP2—I feel the live streamer is knowledgeable.

EXP3—I feel the live streamer is qualified.

EXP4—I feel the live streamer is skilled.

Product Usefulness [42,55,80]

PU1—The product in live streaming commerce is necessary.

PU2—The product in live streaming commerce is beneficial.

PU3—The product in live streaming commerce fulfills a need.

Purchase Convenience [59,81,82]

PC1—Live streaming commerce provides procedures for ordering.

PC2—A first-time buyer can purchase from live streaming commerce without much help.

PC3—Live streaming commerce is very convenient to use.

PC4—Live streaming commerce allows me to make a purchase whenever I want.

PC5—Live streaming commerce allows me to make shopping without going out.

- Product Price [59,83]
- PP1—Live streaming commerce offers products at reasonable prices.
- PP2—Discounted prices are very cheap on live streaming commerce.
- PP3—The price of products on live streaming commerce is economical.
- Perceived Enjoyment [20,28,59,69]
- PerE1—Shopping with live streaming commerce was exciting.
- PerE2—Shopping with live streaming commerce was enjoyable.
- PerE3—Shopping with live streaming commerce was interesting.
- PerE4—I found my visit to live streaming commerce was fun.
- PerE5—Shopping with live streaming commerce was fun for its own sake.
- Perceived Usefulness [20,28,59,69,70]
- PerU1—Using live streaming commerce can save shopping time in searching and buying products.
- PerU2—Live streaming commerce helps me buy what I want online.
- PerU3—Using live streaming commerce can increase my shopping productivity in searching and buying products.
- PerU4—Using live streaming commerce can enable me to have a better search and purchase of products than using other online ways.
- PerU5—Using live streaming commerce can increase my shopping effectiveness.
- Urge to Buy Impulsively [28,50,59,67]
- UBI1—When watching live streaming commerce, I had a desire to buy items that did not pertain to my original shopping goals.
- UBI2—I experienced several sudden urges to buy things when doing shopping on live streaming commerce.
- UBI3—While watching live streaming commerce, I was inclined to purchase items outside my original shopping goal.
- UBI4—When I do the shopping on live streaming commerce, I felt a sudden urge to buy something.
- UBI5—I ended up spending more money than I originally set out to spend.

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