ASEAN Entrepreneurship Journal (AEJ)

The Effect of Scarcity Marketing on Online Impulse Buying Behaviour: The Mediating Role of Perceived Value

Cai Shuang [1], Sylvia Nabila Azwa Ambad [2*]
[1] Faculty of Economics and Management, Xinyu University, Xinyu City, Jiangxi Province, 338004, China. caishuang2022@gmail.com
[1,2] Faculty of Business and Management, Universiti Teknologi MARA Cawangan Sabah, 88997 Kampus Kota Kinabalu, Sabah, Malaysia. nabila1793@uitm.edu.my

*Corresponding Author

Abstract
In the live e-commerce environment, leveraging the scarcity of goods to stimulate consumers' impulse purchases has become a common marketing strategy to create a sense of exclusivity and urgency among consumers. This study examines the impact of two dimensions of scarcity: Limited-Time and Limited-Quantity on consumers' impulse buying behaviour. A quantitative research method was employed, with data collected through an online survey conducted via Questionnaire Star. The survey targeted Douyin, Kuaishou, and Taobao live-stream viewers aged 18 to 34, residing in selected regions of China. This study adapted and modified existing measurement items and analysed the data using SmartPLS 4.0. The findings indicate that only time-limited scarcity positively influences perceived value, which in turn affects online impulse buying behaviour. Limited-Time appears to stimulate the psychological urgency or emotional arousal necessary for impulse purchases more effectively than Limited-Quantity. This study offers valuable insights for e-commerce practitioners and scholars seeking to understand consumers' psychological decision-making processes, particularly within live-streaming platforms.

Keywords: Online Impulse Buying Behaviour, Perceived Value, Scarcity, Limited-Time, Limited-Quantity, Live streaming E-commerce

ARTICLE INFORMATION
Received: 8 Jun 2025
Revised: 22 Jun 2025
Accepted: 27 Jun 2025
Published: 13 Aug 2025

INTRODUCTION

The explosive growth of live e-commerce has reshaped the global consumption landscape. According to statistics, the transaction volume of live e-commerce in China will reach 4.9 trillion yuan in 2023, of which impulse purchases will contribute more than 58% (iResearch, 2023, China Live E-Commerce Industry Report 2023). This behaviour is considered to be driven by immediate situational stimulation and a rapid consumption decision that lacks prudent planning (Rook & Fisher, 1995), and its prevalence is particularly prominent in live broadcast scenarios. For example, data from the Kuaishou platform shows that the order conversion rate within 30 minutes after users watch the live broadcast is 3.2 times higher than that of traditional e-commerce (QuestMobile, 2023). Although impulse buying may cause cognitive dissonance among consumers (Beatty & Ferrell, 1998), the commercial value it creates prompts companies to continuously optimise the trigger mechanism. Therefore, analysing the formation path of impulse buying is not only the key to improving conversion efficiency for companies but also provides empirical support for Consumers' psychological decision-making mechanism.

Existing studies have systematically explored the driving factors of impulse buying in live e-commerce, including anchor interaction behaviour (Li et al., 2024), flow experience (Chen &Yue, 2023), and social presence (Huo et al., 2023). However, there is still a lot of controversy in academia about the mechanism of action of dynamic scarcity strategies, such as real-time inventory warnings and countdown discounts. The traditional view is that scarcity directly promotes purchases by stimulating loss aversion (Aggrawa et al., 2011), but this conclusion faces challenges in live broadcast scenarios. On the one hand, the anchor's real-time speech may strengthen or weaken the credibility of scarcity signals

(Ma et al., 2023). On the other hand, there is an essential difference in consumers' value assessment of limited-time and limited-quantity (Barton, 2022). More importantly, existing literature predominantly examines the direct effect of scarcity on online impulse buying, as well as the mediating role of various emotional factors, including hedonism, utilitarian motives, anticipated regret, fear of missing out (FOMO), and perceived arousal (Qu, 2023; Cengiz and Şenel, 2024; Chung, 2017; Küçükkambak & Süler, 2022). Previous studies often overlook the possibility that such emotions may influence impulse buying behaviour indirectly, primarily through the crucial mechanism of perceived value. This oversight contributes to a lack of precision in the formulation of marketing strategies. Addressing this gap, the present study introduces perceived value as a mediating variable, which represents the main novelty and theoretical contribution of this research.

Perceived value, as the core cognitive framework of consumer decision-making (Zeithaml, 1988), provides a new perspective to bridge the above research gap. Studies have shown that limited supply stimulates impulse by enhancing social value (Sweeney & Soutar, 2001), while limited-time discounts accelerate decision-making by enhancing functional value (Porsan et al., 2023). However, the dynamic interactive characteristics of live e-commerce may reshape this path. For example, anchor interaction may amplify the emotional value of scarcity, but may also weaken the functional value assessment due to information overload (Chen et al., 2024). The dynamic interactive characteristics of live e-commerce strengthen scarcity perception through real-time interaction and emotional appeal, making perceived value both instrumental (cognitive evaluation) and emotional (experience enhancement) (Zhou, 2024). In the dynamic and interactive environment of live e-commerce, limited-time scarcity fosters impulsive behaviour by enhancing consumers' perception of immediate benefits (Guo et al., 2017), whereas limited-quantity scarcity stimulates unplanned purchasing through the activation of resource competition cognition (Griskevicius et al., 2020).

In view of this, the present study seeks to contribute new insights to the existing body of research by systematically examining the mediating mechanism through which different scarcity signals, specifically limited-time scarcity and limited-quantity scarcity, within live streaming contexts influence impulsive purchasing behaviour via perceived value. By integrating signalling theory and the Stimulus Organism Response (SOR) framework, this study aims to offer a novel theoretical perspective for advancing both the strategic management of live e-commerce operations and the understanding of consumer behaviour in this context.

LITERATURE REVIEW

Theoretical Overview

This literature review aims to outline the theoretical framework supporting this study and sort out the relevant theories applied. Subsequently, it focuses on the influencing mechanism of online impulse buying behaviour in the context of live e-commerce, focuses on analysing the key role of perceived value, and points out the research gaps that have not been filled in this field. On this basis, a conceptual framework is constructed to clearly present all relevant variables and their interrelationships. Based on this, a series of research hypotheses are derived. This review widely integrates existing research in multiple disciplines such as sociology, psychology, and education, and strives to fully grasp the relevant concepts and their dynamic connections.

2.1.1 S-O-R Theory

The "stimulus-organism-response" (SOR) model proposed by Mehrabian and Russell (1974) provides a reliable basic framework for understanding how environmental stimuli (S) trigger psychological states (O) and drive behavioural responses (R). In the past, some scholars have studied how cues such as lighting and layout can act as stimuli in physical retail environments to affect consumers' emotional arousal (O), thereby causing consumers to purchase (Robert & John, 1982). With the digital transformation, some scholars have applied SOR to e-commerce environments, pointing out that website design features, such as navigation efficiency and visual appeal, are key stimuli that shape perceived usefulness and click behaviour (Flavián et al., 2020). In recent years, the application of SOR has expanded to the field of live e-commerce. Chang & Yu (2023) found that real-time

interaction between anchors and viewers can enhance cognitive engagement and thus increase purchase intention. Hoang & Dang (2024) found that the social presence of the host in the TikTok live broadcast room and the social presence of the viewers act as stimuli to influence consumers' impulse buying behaviour by awakening passion and happiness. However, these studies mainly regard stimuli as passive inputs, ignoring how consumers actively interpret the impact of stimuli, so it is considered to introduce signalling theory into the SOR theoretical framework for further research.

2.1.2 Signalling Theory

Signalling theory originates from information economics research and aims to explore situations of information asymmetry, where two parties have different levels of information (Spence, 1973; Connelly et al., 2011). Research shows that signalers strategically use hidden signals to play a key role in emotional and unplanned purchase situations (Przepiorka & Berger, 2017). Signalling theory complements the SOR framework and clarifies how consumers interpret environmental stimuli as market signals (Kirmani & Rao, 2000). Given the limitations of time and cognitive resources in the decision-making process, signals can serve as cues for rapid information processing, and the perceived limited supply of goods can enhance consumers' desire for goods (Lee et al., 2018). In scarcity situations, limited-quantity cues convey product exclusivity, while limited-time offers convey a sense of urgency (Barton et al., 2022). These signals shape perceived value, a key organismic factor mediating impulse buying. Numerous empirical studies have also verified this mechanism. Huo (2023) found that live countdown (time scarcity) amplified perceived scarcity signals and increased the likelihood of impulse purchases by 29% compared with static displays (Chou, 2019). This study aims to use signalling theory to identify potential hidden signals and explore their interaction with product signals to trigger impulse purchases.

Online Impulse Buying Behaviour

Impulse buying refers to unplanned, emotion-driven purchasing behaviour (R) with limited cognitive thinking (Rook & Fisher, 1995). But in the digital environment, it takes on a new form. Online platforms, through their interactive interfaces and algorithm-driven personalised services, create an environment conducive to spontaneous purchases (Parboteeah et al., 2009). The stimulus-organism-response (S-O-R) model is often used to explain online impulsive buying behaviour. Visual appeal, limited time offers, and social influence can make consumers feel a sense of pleasure or urgency, thereby affecting perceived value and ultimately triggering impulsive buying behaviour (Verhagen& Van Dolen, 2011; Amos et al., 2014). In addition, technological advances such as artificial intelligence and mobile shopping have enhanced the immediacy and convenience of online shopping, further exacerbating impulsive tendencies (Gupta et al., 2021). Recent studies have also emphasised the role of trust and perceived risk in online impulsive shopping. (Mosunmola et al., 2019). In addition, live e-commerce and social e-commerce platforms introduce social interaction elements that can enhance emotional arousal and perceived scarcity, further driving impulsive behaviour (Indriastuti et al., 2024). In summary, online impulse buying is subject to the interaction of complex factors such as psychological, technological, and environmental factors, and deserves continued attention from the academic community in view of the evolving digital commerce trend.

Scarcity

Marketers aim to stimulate consumers' sense of urgency in shopping by limiting the availability of products in quantity, time or market environment. This is a promotion method that makes products or provides scarce products, which is called scarcity promotion (Cialdini, 1993). Research related to scarcity promotion mainly focuses on the issue of consumer response to scarce products (Aggarwal & Huh, 2011). Studies have shown that scarcity appeals can enhance consumers' willingness to buy and consumption enthusiasm compared with non-scarce products. In addition, scarcity can also cultivate more positive attitudes and behaviours, especially among consumers who have a high demand for uniqueness (Chen, 2022). Scarcity promotion mainly includes two dimensions: one is limited-time, consumers can only enjoy promotional benefits within a specified time; the other

is limited-quantity, the number of promotional products is limited and they are sold out (Feng et al., 2024). For consumers, limited time increases people's sense of urgency to buy, and the timeliness of promotion activities prompts consumers to make purchase decisions as soon as possible (Kristofferson et al., 2017).

2.3.1 Limited-Time

Limited-time refers to setting a specific deadline for promotional products. Consumers can only enjoy the corresponding discount if they purchase within the time limit (Aggrawal et al., 2011). Consumers need to act in time within the time specified by the merchant to enjoy the discount. Exceeding the specified time or range will result in the inability to enjoy the special discounts, thereby stimulating consumers' fear of missing out and increasing their perceived value (Chen, 2022). Guo et al. (2017) pointed out that the more urgent the time is, the stronger the sense of pressure and urgency consumers feel, which strengthens consumers' perception of scarcity and enhances the perceived value of promotional products. Limited-time promotions can induce impulse purchases by creating a sense of scarcity. The scarcity of products can not only increase consumers' interest but also increase their perceived value of products (Broeder & Wentink, 2022). Based on the above research results, it can be hypothesised that:

***H*1: Limited-Time has a positive impact on perceived value.**

2.3.2 Limited-Quantity

Limited-quantity refers to the limit imposed by merchants on the number of products that individuals participating in promotional activities can purchase (Gierl & Huettl, 2010). The scarcity of a product will stimulate people's desire to own it, and when competition is required to obtain it, people's desire to own it will be stronger (Aggrawal et al., 2011). Limited promotions can better enable consumers to perceive the uniqueness of products. Consumers who buy products can feel the respect of their friends around them and enhance their sense of self-worth (Barton et al., 2022). At the same time, it can also stimulate consumers' perceived value, enhance their willingness to buy, and then generate purchasing behaviour (Chen & Sun, 2024). The scarcity of a product not only increases consumers' interest but also increases their perceived value of the product (Song et al., 2021). This paper proposes the following hypothesis:

H2: Limited quantity has a positive impact on perceived value.

Perceived Value

Perceived value is an important variable that affects consumer psychology and behaviour, reflecting the change in the psychological state of consumers from the initial stimulation to the change in attitude or behaviour. Sweeney & Soutar (2001) believed that user perceived value stems from the comparison of perceived utility and payment cost, emphasising the trade-off between perceived performance and cost. Yang and Peterson (2004) described consumer perceived value as the overall perception of products and services throughout the user experience, including time cost and the resulting gains or losses. Gallarza et al. (2011) defined perceived value as the utility evaluation during the shopping process, balancing the gains and losses incurred during the purchase process.

Perceived value is a key antecedent variable that affects consumer psychology and behaviour. It measures the change in the psychological state of consumers from receiving stimulation to experiencing attitude or behaviour change (Peng et al., 2019). The evaluation and perception of product value significantly affect consumers' consumption decisions (Tan et al., 2023). A survey study by Negash et al. (2024) found that functional, social and emotional value significantly affect consumer satisfaction and purchase intention, among which functional value has the most significant impact. Zhou (2024) studied the return and exchange services in live e-commerce and revealed the joint effect of perceived value and expected regret on impulse buying behaviour. Therefore, it can be inferred that:

***H*3: Perceived value has a positive impact on consumers' impulse buying behaviour.**

Mediating Role of Perceived Value

Wu et al. (2021) found that scarcity cues enhance perceived value, which in turn significantly affects purchase intention in an e-commerce environment. Similarly, Wu&Lee (2016) showed that perceived value mediated the relationship between scarcity cues and impulse buying in live streaming, reinforcing its role as a behavioural bridge. Choi and Qu (2017) distributed online questionnaires to college students in South Korea and China for empirical analysis. The results indicate that, within the Korean sample, scarce information enhances the urge to engage in impulsive purchasing by increasing both utilitarian and hedonic value. However, in the Chinese sample, the relationship between scarce information and utilitarian value is not statistically significant. Consequently, the perceived value does not significantly contribute to stimulating consumers' impulse to purchase, which suggests that such effects may depend on cultural differences and the contextual setting of the study.

Peng et al. (2019) explored the impact of holiday promotions on consumers' online impulse buying behaviour and found that time pressure has a positive impact on impulse buying by mediating perceived value. Under time pressure, consumers often redefine promotions as more valuable because of their short-term nature, and this perceived value becomes a key psychological driver that links urgency to unplanned purchasing behaviour (Shao et al., 2023). Broeder and Wentink (2022) believed that limited-time would increase the perception of scarcity and thus activate stronger perceived competition. However, this effect was evident only among Italian consumers, indicating that the outcomes differ across countries, as it was not observed among Dutch consumers. Based on the above research results, this study proposes the following hypothesis:

H4: Perceived value mediates the relationship between Limited-Times and online impulse buying behaviour

When consumers encounter limited-quantity promotions, they perceive higher exclusivity and value, which leads to impulsive decisions (Wu&Lee, 2016). Wu et al. (2021) found that limited quantity strategies significantly stimulate purchase intention by enhancing consumers' functional value (cost-effectiveness) and emotional value (pleasure). Empirical research shows that in digital commerce contexts, perceived value significantly mediates the impact of scarcity (including Limited-Quantity) on online behaviour (Guo et al., 2017). However, Cengiz & Şenel (2024) have found that scarcity directly increases impulse buying, while perceived value has no significant mediating effect because consumers doubt the authenticity of scarcity cues or experience psychological resistance (Gupta & Gentry, 2019). Although the empirical findings are somewhat inconsistent, the underlying theoretical perspective supports the mediating role of perceived value in the relationship between scarcity and impulse buying. Therefore, the following hypothesis is proposed:

H5: Perceived value mediates the relationship between Limited-Quantity and online impulse buying behaviour

Research Framework

This study uses the Limited-Time and Limited-Quantity of scarcity in e-commerce live streaming as independent variables, perceived value as the mediating variable, and online impulse buying behaviour as the dependent variable. The constructed research model is shown in Figure 1:

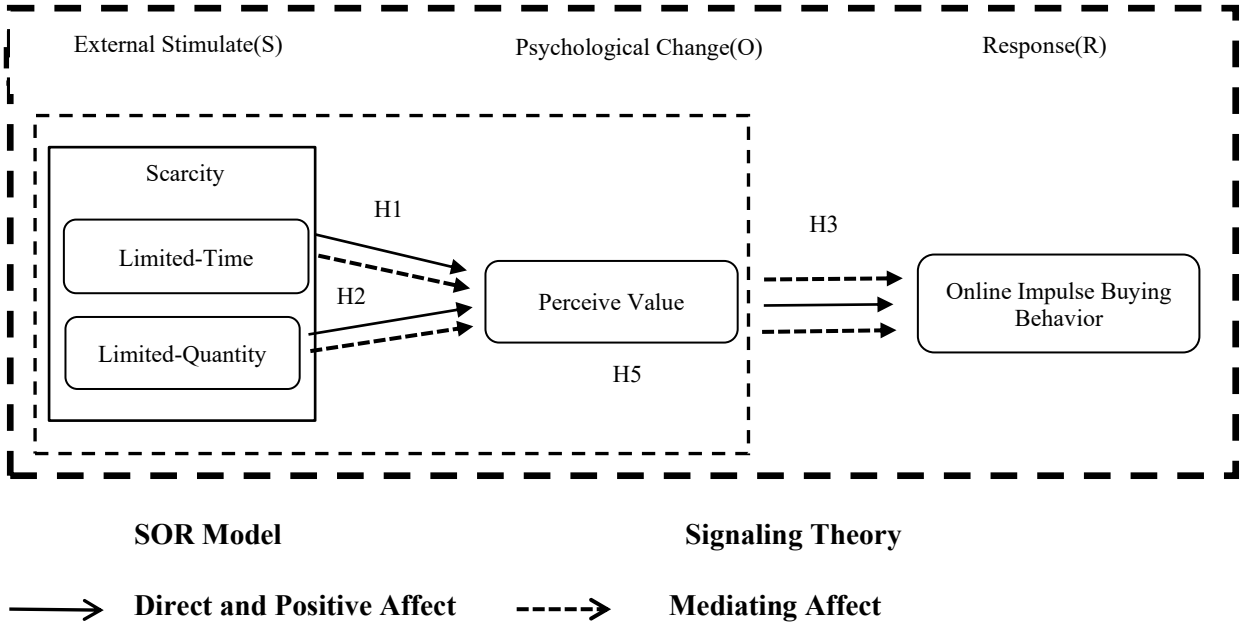

Figure 1: Conceptual Framework

Summary of Research Hypotheses

All these variables are intended to clarify factors affecting consumers' online impulse buying behaviour. This study proposes five hypotheses based on the literature review and previous discussions. The following outlines the list of hypotheses.

Table 1: Summary of Research Hypotheses

H1	Limited-Time has a positive effect on perceived value.
H2	Limited-Quantity has a positive effect on perceived value.
H3	Perceived value has a positive effect on Online Impulse Buying Behaviour.
H4	Perceived Value mediates the relationship between Limited-Time and Online Impulse Buying Behaviour.
H5	Perceived Value mediates the relationship between Limited-Quantity and Online Impulse Buying Behaviour.

RESEARCH METHODOLOGY

Research Design

This study uses quantitative research to verify the proposed hypotheses and investigate the relationship between scarcity, perceived value, and online impulse buying behaviour. This study uses a causal research design to explore the mechanism of action between independent variables and dependent variables. Data collection is completed through a self-administered online questionnaire on the Questionnaire Star platform. The selection of this method is based on the pre-conditions and abilities of the target respondents to shop online. Before the formal survey was implemented, a questionnaire pre-test was conducted, and three experts in the field from the University of Technology Mara were invited to review the content of the scale. According to the feedback from the experts, some sentences had double meanings, so the number and wording of the items on perceived quality and impulsive buying were adjusted. In order to ensure the reliability and validity of the research tool, 30 respondents were selected for a pilot test, and the results showed that both reliability and validity met the requirements. In addition,

from the feedback from the respondents, it was found that some of the items in the scale of previous studies had different measures from the live e-commerce environment, so the content of the items was slightly modified.

Research Measurement

The measurement scale designed in this study mainly draws on the research scales of other scholars. In order to enable respondents to correctly understand the scale, the scale items were modified according to the research context. As shown in Table 2, the three items on Limited-Time were adapted from the study of Aggrawal et al. (2011), the three items on Limited-Quantity were adapted from Gierl and Huettl (2010), the five items on perceived value were adapted from Sweeney & Soutar (2001), and the four items on online impulse buying behaviour were adapted from Rook & Fisher (1995). This study made appropriate adjustments to the wording of the questionnaire items to fit the specific research context. All measurement items were evaluated using a 5-point Likert scale, with a score range of 1 (strongly disagree) to 5 (strongly agree). The Likert scale is particularly suitable for measuring attitudes and opinions in the fields of social sciences, management, marketing, education, tourism, and health care due to its universality in survey research (Jebb et al., 2021).

In order to ensure that Chinese respondents accurately understand the meaning of the questions and avoid ambiguity or misunderstanding, this study specially provides a bilingual version of the questionnaire in Chinese and English. The specific implementation process is: first, design the English version of the questionnaire, translate it into Chinese by professional translators, and then have it proofread and reviewed by language experts.

Table 2: Scale Items

Constructs	No. of Items	Scale
Limited-Time	3 items	Five-Point Likert Scale
Limited-Quantity	3 items	Five-Point Likert Scale
Perceived Value	5 items	Five-Point Likert Scale
Online Impulse Buying Behaviour	4 items	Five-Point Likert Scale

Sampling

The study focuses on China's emerging live e-commerce consumers. The target sample must meet both conditions: have completed at least one online transaction through mainstream live platforms such as Douyin, Kuaishou or Taobao; and have experience in watching live shopping scenes. As the usage rate and user scale of live broadcasts increase year by year, more and more people are aware of the importance of online live broadcasts and live e-commerce. In 2022, about 47% of the top live broadcast platforms in China came from Douyin (Statista, 2023, Market Share Report). Syntun data shows that in the first three quarters of 2022, the market shares of Taobao Live, Kuaishou e-commerce and Douyin e-commerce were 40.5%, 32% and 27.5% respectively (Syntun, 2023). The study pays special attention to the 18-34-year-old youth consumer group, which has significant consumption characteristics: the consumption capacity is 136% higher than that of the group over 35 years old, and the average annual user growth rate remains at 9.7% (iResearch, 2023). Due to the research cycle and resource limitations, this survey focuses on young consumers living in Jiangxi, Anhui and Guangxi provinces, and the data collection period is the third quarter of 2024. This is because Jiangxi, Guangxi and Anhui are the three provinces with the highest proportion of young people and high participation in live broadcasts, and the three provinces have great differences in culture and geographical location, which makes the research results more representative of China. The sample size was calculated using G*Power 3.1 software (effect size f^2=0.25, α=0.05, β=0.2), and the minimum effective sample size was determined to be 128 cases. Finally, purposive sampling was used to obtain 222 valid data. The survey was implemented through the professional online data platform "Questionnaire Star".

Respondents' Profile

The study finally obtained 222 valid samples, and the distribution of demographic characteristics is illustrated in Table 3. From the age structure of the respondents, 18-24 years old accounted for 71.6% (n=159), and the 25-34 years old group accounted for 29.4% (n=63), which is highly consistent with the core user portrait of live e-commerce. Female participants accounted for 78.4% (n=174), significantly higher than male participants (21.6%, n=48). This distribution verifies the dominant position of women in live broadcast consumption (Long & Tefertiller, 2020). Studies have shown that female users are more susceptible to impulse purchases due to the atmosphere of the live broadcast room, and their average consumption frequency is 2.3 times higher than that of men. In terms of online behaviour, 73.9% of respondents use their mobile terminals for an average of ≥3 hours per day, of which 54.5% of users use the terminals for more than 5 hours per day. All samples have experienced impulsive purchases in live broadcast scenarios, which confirms the effectiveness of sample screening.

RESULTS

Measurement Model Evaluation

This study uses the partial least squares structural equation model (PLS-SEM) in the SmartPLS 4.0 statistical analysis tool for data analysis, strictly referring to the methodological framework proposed by Henseler et al. (2015). When verifying the measurement model, the validity and reliability of the measurement model were systematically tested based on the evaluation specifications established by Hair et al. (2019) and Ramayah et al. (2018). Specific indicators include the item loading, average variance extracted value (AVE) and composite reliability index (CR) of the observed variables. According to the measurement standard requirements, the factor loading of each manifest variable and the corresponding latent variable should meet the minimum threshold of 0.7, the AVE value of the latent construct should reach 0.5 or above, and the composite reliability (CR) reflecting internal consistency should be greater than or equal to 0.7.

The data analysis results of this study show (as shown in Table 3) that the factor loadings of all observed variables meet the measurement requirements, and their values are all higher than the critical value of 0.7. All AVE indicators were stably maintained above the 0.5 baseline, and the CR coefficients all exceeded the threshold of 0.7, which together confirmed that the measurement tool has good structural reliability and internal consistency characteristics. In addition, Cronbach's α coefficients of each dimension in the measured data ranged from 0.741 to 0.896, and all indicators exceeded the qualified standard of 0.7, which fully demonstrated that the scale design has ideal internal consistency reliability. This further confirms that these constructs are effective in measuring the expected theoretical constructs.

Table 3: Measurement Model Analysis

Construct/Items	Loadings	Cronbach's Alpha	CR	AVE
Limited-Time				
TL1	0.741	0.738	0.851	0.656
TL2	0.838			
TL3	0.846			
Limited-Quantity				
QL1	0.818	0.759	0.861	0.675
QL2	0.863			
QL3	0.781			
Perceived Value				
PV1	0.774	0.854	0.896	0.633
PV2	0.805			
PV3	0.841			
PV4	0.818			
PV5	0.735			
Online Impulse Buying Behavior				
OIBB1	0.871	0.899	0.929	0.767
OIBB2	0.863			
OIBB3	0.873			
OIBB4	0.896			

This study uses the HTMT analysis method to test discriminant validity. Referring to the standards proposed by Henseler et al. (2015) and Franke and Sarstedt (2019), the HTMT index must be lower than 0.85; if a stricter or looser evaluation standard is adopted, the upper limit of this value can be relaxed to 0.90. As shown in the data in Table 4, the maximum HTMT value among all constructs is only 0.788, indicating that there is a significant degree of differentiation among the variables. Combining the results of various validity tests, the reliability and validity of the measurement tool have reached an ideal level.

Table 4: Discriminant Validity

	OIBB	PV	QL	TL
OIBB				
PV	0.712			
QL	0.282	0.346		
TL	0.390	0.477	0.788	

Structural Model Evaluation

This study refers to the method of Hair et al. (2019), and the key statistical indicators of the structural model, such as path coefficient, standard error, t value and p-value, are presented in detail in Table 3. These data are calculated by the 5,000 bootstrap sampling method proposed by Ramayah et al. (2018). It should be pointed out that, as Lovell (2020) suggested, it is not comprehensive to rely solely on the p-value to judge the significance of the hypothesis. A more scientific approach is to comprehensively consider multiple evaluation criteria such as p-value, confidence interval and effect size.

Table 5 shows the results of the hypothesis test. The results show that Limited-Time has a positive effect on perceived value (H1: β=0.627, p=0.000); similarly, perceived value has a positive effect on online impulse buying behaviour (H3: β=0.333, p=0.000). On the contrary, Limited-Quantity has no significant effect on perceived value (H2: β=0.082, p> 0.05). The indirect effect of Limited-Time on online impulse buying behaviour through perceived value is significant (H4: β = 0.209, p = 0.000), so the mediation effect of H4 is supported. Meanwhile, there is no mediating effect of perceived value on the relationship between Limited-Quantity and online impulse buying behaviour (β = 0.052, p> 0.05), so the mediation effect of H5 is not supported.

Table 5: Results of Hypothesis Testing

Relationship	Std Beta	Std Dev	t-value	p-value	BCI LL	BCI UL	f^2	Supported
TL -> PV	0.333	0.046	13.636	0.000	0.182	0.470	0.084	Yes
QL -> PV	0.082	0.082	0.997	0.159	-0.062	0.203	0.005	No
PV->OIBB	0.627	0.087	3.823	0.000	0.543	0.695	0.649	Yes
TL->PV->OIBB	0.209	0.057	3.644	0.000	0.115	0.304		Yes
QL->PV->OIBB	0.052	0.052	0.983	0.163	-0.039	0.130		No

DISCUSSION

Our results provide strong support for Hypothesis 1, which states that the Limited-Time scarcity in live e-commerce scenarios has a significant impact on the perceived value of online consumers. This result is consistent with numerous previous studies (Chen, 2022; Broeder &Wentink, 2022; Guo et al.,2017), which have consistently shown a significant effect on Limited-Time scarcity and perceived value. In addition, our results are consistent with the theoretical basis of "signalling theory". This theory holds that, given the time constraints in the decision-making process, signals can serve as cues for rapid information processing, and consumers will perceive that the supply of goods is limited, thereby enhancing their desire for the goods. The results of this study show that in the live e-commerce environment, consumers are more likely to make impulsive decisions when they see limited-time offers or countdowns because these offers will stimulate a psychological sense of urgency, thereby strengthening consumers' perception of scarcity. This also shows that Limited-Time scarcity is a key factor in consumers' perceived value in the live e-commerce environment.

Hypothesis 2 found that limited-quantity scarcity has no significant effect on perceived value. This finding contrasts with several previous studies, such as Barton et al. (2022), Song et al. (2021), and Chen and Sun (2024). One possible explanation for this discrepancy is the increasing consumer awareness of marketing tactics, particularly in the context of flash sales and promotional strategies. As such practices become more common, consumers may grow sceptical of quantity limitations, perceiving them as artificial or manipulative, which in turn diminishes their effectiveness in influencing perceived value. Consequently, scarcity-based signals, especially those based on limited quantity, may not consistently produce the intended effects, and their influence may be contingent upon boundary conditions such as the credibility of the signal, platform norms, and consumers' interpretative abilities.

In addition, our study supports Hypothesis 3, that perceived value will positively affect consumers' online impulse buying behaviour. This result is consistent with previous studies showing that consumers will make impulse purchases in live broadcast rooms because of perceived value (Tan et al., 2023; Negash et al., 2024; Zhou,2024). That is, consumers form a comprehensive perceived value through multi-dimensional information (such as product demonstration, price discount, anchor reputation, etc.) in the live broadcast scene, which in turn triggers emotional awakening and behavioural impulse. In addition, the immersive and entertaining nature of live shopping can enhance emotional arousal, thereby amplifying the impact of perceived value on impulse buying behaviour. This also shows that the perceived value in live e-commerce is not purely rational, but is also affected by emotional and experiential factors.

Next, this study supports Hypothesis 4, namely that perceived value mediates the relationship between limited-time scarcity and consumers' online impulse buying behaviour. This finding is consistent with previous studies by Peng et al. (2019), Broeder and Wentink (2022), and Shao et al. (2023), which suggest that when consumers perceive a product to be available only for a limited time, they often interpret it as scarce or in high demand. Such a perception increases the perceived value of the product, particularly in fast-paced and interactive live broadcasts, where the sense of urgency and excitement is heightened. The enhanced perceived value then becomes a key motivation to convert the sense of urgency into actual purchasing behaviour. This finding also suggests that in the dynamic scene of live broadcast, countdown pressure prompts consumers to quickly integrate instant information, make value judgments based on whether it is cost-effective or emotionally satisfying, and thus quickly make purchase decisions.

This study found through empirical analysis that Hypothesis 5: Neither the direct nor the indirect effects of Limited-Quantity on online impulse buying behaviour through perceived value are significant. This finding differs from some previous studies that emphasise the importance of quantity scarcity restrictions in perceived value and influencing consumer decisions (Wu&Lee, 2016; Wu et al., 2021; Guo et al.,2017) and is consistent with the study conducted by Cengiz and Şenel (2024). Although previous studies have shown that limited-quantity scarcity triggers unplanned purchases by activating resource competition cognition (Griskevicius et al., 2020). However, in the live streaming e-commerce environment, on the one hand, the lack of social presence will weaken consumers' perception of the urgency of resource competition. On the other hand, the influence of two important moderating variables, consumer scepticism and self-control ability, will also make it impossible for scarcity to trigger impulse buying (Gupta & Gentry, 2019). Without reliable signals to support the authenticity of these restrictions, such cues may fail to enhance perceived value and thus stimulate the psychological urgency or emotional arousal required for impulse buying. So marketers should be cautious about over-relying on quantity scarcity as an independent strategy.

The final hypothesis in this study, which is Hypothesis 5, found that perceived value does not mediate the relationship between limited-quantity and impulse buying behaviour. This finding differs from earlier studies that emphasise the importance of quantity scarcity in enhancing perceived value and influencing consumer decision-making (Wu and Lee, 2016; Wu et al., 2021; Guo et al., 2017), but is consistent with the results reported by Cengiz and Şenel (2024). Although previous research has suggested that limited-quantity scarcity can trigger unplanned purchases by activating resource competition cognition (Griskevicius et al., 2020), the live-streaming e-commerce environment presents different dynamics. For example, the absence of a strong social presence may reduce consumers' perception of urgency regarding resource competition. Furthermore, two critical moderating factors, namely consumer scepticism and self-control, may

inhibit the effect of scarcity cues on impulse buying behaviour (Gupta and Gentry, 2019). In the absence of credible signals to verify the authenticity of such scarcity claims, these cues may fail to enhance perceived value or evoke the psychological urgency and emotional arousal typically required to stimulate impulse purchases. Therefore, marketers should be cautious about relying solely on quantity scarcity as an independent marketing strategy

THEORETICAL, PRACTICAL AND SOCIAL IMPLICATIONS

In the field of live e-commerce, signalling theory has been used to understand the relationship between scarcity and purchase intention. However, online consumers' purchasing behaviour is more of an unplanned, impulsive purchase behaviour, and how scarcity strategies induce consumers to make impulsive purchases is relatively unstudied. This study fills this gap by empirically testing the mediating role of perceived value between scarcity and online impulsive purchase behaviour. The conclusions of this study provide valuable contributions to existing research on impulsive purchase behaviour and extend the application of signalling theory and the SOR model to the field of live e-commerce.

In addition, a key aspect of this study is to adjust the research tools in previous studies to adapt them to live e-commerce, a relatively new and rapidly developing social e-commerce platform. This adjustment involves customising the measurement items based on the actual situation of young Chinese consumers today and the platform software they use most frequently. Some modifications are also made to enable respondents to correctly understand the measurement indicators. More importantly, these measurement items have undergone rigorous validity and reliability tests, confirming that the tools used in this study are valid and reliable. Finally, future follow-up studies that hope to explore the field of live e-commerce (especially the Limited-Time and Limited-Quantity of scarcity) and perceived value can consider adopting the measurement items in this study.

This study holds significant practical implications for live e-commerce practitioners and merchants. Notably, perceived value demonstrates the strongest and most substantial influence on online impulse buying behaviour ($f^2 = 0.649$). This finding suggests that, among all examined factors, consumers place considerable emphasis on the overall value of a product or service when making unplanned purchase decisions. Perceived value, which refers to the consumer's evaluation of the benefits received in relation to the cost or effort expended, plays a critical role in shaping spontaneous buying tendencies. When consumers perceive high value, whether through favourable pricing, quality assurance, or additional benefits, they are more likely to experience immediate purchase motivation. Therefore, sellers and marketers should prioritise strategies that enhance perceived value, such as offering product bundles, limited-time offers, high-quality visuals, and clear value propositions, to effectively stimulate impulse purchases in live e-commerce environments.

Next, the results highlight the mediating role of perceived value in Limited-Time scarcity and impulse buying behaviour, and the lack of mediating role of perceived value in limited-quantity scarcity constraints and impulse buying behaviour. This suggests that platforms such as Douyin and Taobao can leverage artificial intelligence algorithms to deliver personalised emergency notifications. For example, users can be alerted that the items remaining in their shopping carts are about to sell out or that only a few minutes remain at the current price. These notifications create a strong sense of urgency, increasing the perceived value and scarcity of the products. In addition, platforms can introduce gamified scarcity strategies, where users unlock discounts by participating in time-limited activities such as clicking on or sharing a live broadcast within a countdown period. These techniques help consumers perceive greater value under time pressure, effectively stimulate impulse buying behaviour, and ultimately enhance the platform's sales performance.

From the perspective of social impact, this study provides valuable insights for online anchors and e-commerce enterprise influencers on which dimensions of scarcity will affect consumers' impulse buying behaviour, as well as analysing the psychological decision-making mechanism of consumers in the process of watching live broadcasts. In an era characterised by digital transformation of marketing, the marginal utility of social media anchors, especially scarcity strategies as widely used marketing strategies, is gradually weakening. As consumers shift their attention to real-time

interaction, product demonstrations, and anchor influence to seek guidance on purchase decisions, this phenomenon not only reflects the increasing rationality of consumer decision-making processes but also shows that the effectiveness of the scarcity effect depends on the dual role of consumer trust perception and value assessment. This study encourages e-commerce anchors to stimulate buying impulses by focusing on improving perceived value, thereby improving the effectiveness of live broadcasts. Understanding consumers' psychological responses and the factors that influence their emotions can help identify what drives impulse buying behaviour. Enhancing interactive experience design to increase emotional connection and user engagement can also improve the monetisation outcomes of live broadcast platforms.

LIMITATIONS AND FUTURE RESEARCH SUGGESTIONS

While this study makes a meaningful contribution to academic discussions, the field of live e-commerce, and broader social cognition, it still has some limitations. First, the research subjects are limited to young consumers aged 18 to 34. Given the growing enthusiasm and purchasing power of middle-aged people for online shopping, excluding this group may limit the generalizability of the research results. Future research should cover a wider age range, especially middle-aged users. Second, the geographical scope of the study is limited to the three provinces of Jiangxi, Guangxi, and Anhui. This geographical limitation may ignore the influence of behavioural diversity and cultural differences of users in other parts of China, thus affecting the representativeness of the conclusions. Third, this study only focuses on users of currently dominant live-streaming platforms such as Douyin, Kuaishou, and Taobao. However, as the digital ecosystem continues to develop, emerging platforms and social media such as Bilibili and Xiaohongshu are increasingly adopting live-streaming functions. Future investigations should cover more types of platforms to better reflect the changes in consumer engagement and psychological reactions. Finally, the use of cross-sectional data limits the ability to establish causal relationships between the research variables. Future research can adopt longitudinal or experimental designs to better understand how these relationships evolve over time.

AUTHOR CONTRIBUTION, FUNDING, ACKNOWLEDGEMENT AND CONFLICT OF INTEREST

Author Contributions: Cai Shuang led the writing of the doctoral dissertation manuscript under the guidance of doctoral supervisor, Sylvia Nabila Azwa Ambad. The thesis involves multiple aspects such as draft writing, data collection, and data analysis. As the corresponding author, Sylvia Nabila Azwa Ambad is responsible for the submission, review of the article, proofreading and ensuring consistency in writing style. Each author provided critical feedback and played an important role in the research, analysis, and writing of the manuscript.

Funding: This research received no external funding.

Acknowledgements: I sincerely thank my supervisor, Associate Professor Dr Nabila Azwa Binti Ambad, for her expert guidance, critical feedback, and continuous support throughout this research. Her profound insights significantly enhanced the theoretical framework and methodological rigour of the study.

I am grateful to my colleagues, friends, and students who participated in the questionnaire survey. Their willingness to share experiences and perspectives was crucial to the empirical validation of the findings.

Finally, Special thanks are extended to Universiti Teknologi MARA (UiTM), the anonymous reviewers and editors for their constructive comments during the peer-review process. Their suggestions greatly improved the clarity and scholarly impact of this manuscript.

Conflicts of Interest: We certify that this article is the original work of the authors and co-authors. This article has not been previously published or considered for publication elsewhere. This study/manuscript has not been submitted for publication and has not been published in whole or in part elsewhere. We certify that all authors have made a substantial contribution to the validity and legitimacy of the data and its interpretation submitted to the ASEAN Entrepreneurship Journal.

REFERENCES

Aggrawal, P., Jun, S. Y., & Huh, J. H. (2011). Scarcity messages consumer competition perspective. Journal of Advertising, 40(3), 19-30.

Amos, C., Holmes, G. R., & Keneson, W. C. (2014). A meta-analysis of consumer impulse buying. *Journal of Retailing and Consumer Services*, *21*(2), 86-97.

Barton, B., Zlatevska, N., & Oppewal, H. (2022). Scarcity tactics in marketing: A meta-analysis of product scarcity effects on consumer purchase intentions. *Journal of Retailing*, *98*(4), 741-758.

Beatty, S. E., & Ferrell, M. E. (1998). Impulse buying: Modeling its precursors. Journal of Retailing, 74(2), 169-191.

Broeder, P., & Wentink, E. (2022). Limited-time scarcity and competitive arousal in E-commerce. *The International Review of Retail, Distribution and Consumer Research*, *32*(5), 549-567.

Cengiz, H., & Şenel, M. (2024). The effect of perceived scarcity on impulse-buying tendencies in a fast fashion context: A mediating and multigroup analysis. *Journal of Fashion Marketing and Management: An International Journal*, *28*(3), 405-425.

Chang, S. E., & Yu, C. (2023). Exploring gamification for live-streaming shopping—influence of reward, competition, presence and immersion on purchase intention. *IEEE Access*, *11*, 57503-57513.

Chen, A., Chen, Y., Li, R., & Lu, Y. (2024). The interaction between the anchor and customers in live-streaming E-commerce. *Industrial Management & Data Systems*, *124*(6), 2151-2179.

Chen, H. J., & Sun, T. H. (2014). Clarifying the impact of product scarcity and perceived uniqueness in buyers' purchase behaviour of games of limited-amount version. *Asia Pacific Journal of Marketing and Logistics*, *26*(2), 232-249.

Chen, Y., & Yue, W. (2023, May). The influence of marketing stimuli and contextual factors on consumers' intention to make impulse purchases in live e-commerce. In *Wuhan International Conference on E-business* (pp. 131-142). Cham: Springer Nature Switzerland.

Chen, Z., & Zhu, D. H. (2022). Effect of dynamic promotion display on purchase intention: The moderating role of involvement. *Journal of Business Research*, *148*, 252-261.

Choi, S., & Qu, M. (2017). The effectiveness of scarcity messages in group-buying social commerce: the comparison of Korea and China.

Chou, H. Y. (2019). Units of time do matter: How countdown time units affect consumers' intentions to participate in group-buying offers. *Electronic commerce research and applications*, *35*, 100839.

Chung, N., Song, H. G., & Lee, H. (2017). Consumers' impulsive buying behaviour of restaurant products in social commerce. *International Journal of Contemporary Hospitality Management*, *29*(2), 709-731.

Cialdini, R. B. (1993). The psychology of persuasion. *New York*.

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management, 37*(1), 39–67. https://doi.org/10.1177/0149206310388419

Feng, Z., Al Mamun, A., Masukujjaman, M., Wu, M., & Yang, Q. (2024). Impulse buying behaviour during live streaming: Moderating effects of scarcity persuasion and price perception. *Heliyon*, *10*(7).

Flavián, C., Gurrea, R., & Orús, C. (2020). Combining channels to make smart purchases: The role of webrooming and showrooming. *Journal of Retailing and Consumer Services, 52*, 101923. https://doi.org/10.1016/j.jretconser.2019.10192

Gallarza, M. G., Gil-Saura, I., & Holbrook, M. B. (2011). The value of value: Further excursions on the meaning and role of customer value. *Journal of Consumer Behaviour*, *10*(4), 179-191.

Gierl, H., & Huettl, V. (2010). Are scarce products always more attractive? The interaction of different types of scarcity signals with products' suitability for conspicuous consumption. International Journal of Research in Marketing, 27(3), 225-235.

Goldsmith, K., Griskevicius, V., & Hamilton, R. (2020). Scarcity and consumer decision making: Is scarcity a mindset, a threat, a reference point, or a journey? *Journal of the Association for Consumer Research*, 5(4), 358-364.

Good, M. C., & Hyman, M. R. (2021). Direct and indirect effects of fear-of-missing-out appeals on purchase likelihood. *Journal of Consumer Behaviour*, *20*(3), 564-576.

Guo, J., Xin, L., & Wu, Y. (2017). Arousal or not? The effects of scarcity messages on online impulsive purchase. In *HCI in Business, Government and Organizations. Supporting Business: 4th International Conference, HCIBGO 2017, Held as Part*

of HCI International 2017, Vancouver, BC, Canada, July 9-14, 2017, Proceedings, Part II 4 (pp. 29-40). Springer International Publishing.

Gupta, P., Prashar, S., Parsad, C., & Vijay, T. S. (2021). Role of shopping app attributes in creating urges for impulse buying: An empirical investigation using SEM and neural network technique. *Journal of Electronic Commerce in Organizations (JECO)*, *19*(1), 43-64.

Gupta, S., & Gentry, J. W. (2019). 'Should I Buy, Hoard, or Hide?'-Consumers' responses to perceived scarcity. *The International Review of Retail, Distribution and Consumer Research, 29*(2), 178-197.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the academy of marketing science*, *43*, 115-135.

Hoang, V. T., & Dang, H. P. (2024). Exploring How the Characteristics of Live Streaming Affect Impulse Buying Behaviour in Live Streaming Commerce: The Mediating Effect of Trust and Flow Experience. *Int. Journal of Business Science and Applied Management*, *19*(1).

Huo, C., Wang, X., Sadiq, M. W., & Pang, M. (2023). Exploring factors affecting consumer's impulse buying behaviour in live-streaming shopping: An interactive research based upon SOR model. *Sage Open*, *13*(2), 21582440231172678.

Indriastuti, H., Hidayati, T., Martiyanti, D., Ayu, A. R. F., & Putit, L. (2024). How Real-Time Interactivity Influences Impulse Buying Behaviour in Generation Z's During Live Streaming Shopping: The Mediating Role of Perceived Enjoyment. *ECONOMICS-INNOVATIVE AND ECONOMICS RESEARCH JOURNAL*, *12*(3), 279-291.

iResearch. (2023). *China Live Streaming e-commerce Industry Research Report 2023*. iResearch Consulting Group.

Jebb, A. T., Ng, V., & Tay, L. (2021). A review of key Likert scale development advances: 1995–2019. *Frontiers in Psychology*, *12*, 637547.

Khetarpal, M., & Singh, S. (2024). "Limited time offer": Impact of time scarcity messages on consumer's impulse purchase. *Journal of Promotion Management*, *30*(2), 282-301.

Kirmani, A., & Rao, A. R. (2000). No pain, no gain: A critical review of the literature on signaling unobservable product quality. *Journal of Marketing, 64*(2), 66–79. https://doi.org/10.1177/002224290006400205

Krallman, A., Pelletier, M., & Barnes, D. (2020). Get it before it's gone: Understanding scarcity perceptions in fashion: An abstract. In *Enlightened Marketing in Challenging Times: Proceedings of the 2019 AMS World Marketing Congress (WMC)* 22 (pp. 461-462). Springer International Publishing.

Kristofferson, K., McFerran, B., Morales, A. C., & Dahl, D. W. (2017). The dark side of scarcity promotions: How exposure to limited-quantity promotions can induce aggression. *Journal of Consumer Research*, *43*(5), 683-706.

Küçükkambak, S. E., & Süler, M. (2022). The mediating role of impulsive buying in the relationship between fear of COVID-19 and compulsive buying: a research on consumers in Turkey. *Sosyoekonomi*, *30*(51), 165-197.

Lee, S. Y., Oh, S., & Jung, S. (2018). Influence of scarcity claims on product evaluation: The role of reversibility of decision. *Social Behavior and Personality: an international journal*, *46*(2), 281-292.

Li, L., Feng, Y., & Zhao, A. (2024). An interaction–immersion model in live streaming commerce: the moderating role of streamer attractiveness. *Journal of Marketing Analytics*, *12*(3), 701-716.

Long, Q., & Tefertiller, A. C. (2020). China's new mania for live streaming: Gender differences in motives and uses of social live streaming services. *International Journal of Human–Computer Interaction*, *36*(14), 1314-1324.

Lovell, D. P. (2020). Null hypothesis significance testing and effect sizes: can we 'effect everything… or… anything?. *Current opinion in pharmacology*, *51*, 68-77.

Ma, E., Liu, J., & Li, K. (2023). Exploring the mechanism of live streaming e-commerce anchors' language appeals on users' purchase intention. *Frontiers in Psychology*, *14*, 1109092.

Mandolfo, M., Bettiga, D., Lamberti, L., & Noci, G. (2022). Influence of sales promotion on impulse buying: A dual process approach. *Journal of Promotion Management*, *28*(8), 1212-1234.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. MIT Press.

Mosunmola, A., Adegbuyi, O., Kehinde, O., Agboola, M., & Olokundun, M. (2019). Perceived value dimensions on online shopping intention: The role of trust and culture. *Academy of Strategic Management Journal*, *18*(1), 1-20.

Negash, Y. T., Jyun, L. P., Tarhini, A., & Rehman, S. U. (2024). Business strategic insight: understanding the impact of perceived value and impulsiveness on consumer response in global mobile shopping. *Review of International Business and Strategy*, *34*(3), 341-367.

Nichols, B. S. (2017, January). Advertising appeals and a psychological scarcity effect: competitive arousals and implications on purchase interest. In *The Customer is NOT Always Right? Marketing Orientations in a Dynamic Business World: Proceedings of the 2011 World Marketing Congress* (pp. 23-23). Cham: Springer International Publishing.

Parboteeah, D. V., Valacich, J. S., & Wells, J. D. (2009). The influence of website characteristics on a consumer's urge to buy impulsively. *Information systems research*, *20*(1), 60-78.

Peng, L., Zhang, W., Wang, X., & Liang, S. (2019). Moderating effects of time pressure on the relationship between perceived value and purchase intention in social E-commerce sales promotion: Considering the impact of product involvement. *Information & Management*, *56*(2), 317-328.

Porsan, P. W., Surja, S., & Kurniawati, H. (2024, December). The Impact of Social Media's Live Shopping Feature on the Behavioural Responses of Indonesia's Generation Z. In *2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA)* (pp. 720-725). IEEE.

Przepiorka, W., & Berger, J. (2017). Signaling theory evolving: Signals and signs of trustworthiness in social exchange. *Social dilemmas, institutions, and the evolution of cooperation*, 373-392.

Qi, L., & Xiaoli, S. (2024). The Impact of Anchor Characteristics On Customers'sustainable Follow in E-Commerce Live Broadcast--Based on The Survey of Tiktok Users in China. *International Journal of Business & Society*, *25*(1).

Qu, Y., Khan, J., Su, Y., Tong, J., & Zhao, S. (2023). Impulse buying tendency in live-stream commerce: The role of viewing frequency and anticipated emotions influencing scarcity-induced purchase decision. *Journal of Retailing and Consumer Services*, *75*, 103534.

QuestMobile. (2023). *2023 China mobile internet insight report: Live commerce chapter*.

Ramayah, T. J. F. H., Cheah, J., Chuah, F., Ting, H., & Memon, M. A. (2018). Partial least squares structural equation modeling (PLS-SEM) using smartPLS 3.0. *An updated guide and practical guide to statistical analysis*, *1*(1), 1-72.

Robert, D., & John, R. (1982). Store atmosphere: an environmental psychology approach. *Journal of retailing*, *58*(1), 34-57.

Rook, D. W., & Fisher, R. J. (1995). Normative influences on impulsive buying behaviour. Journal of Consumer Research, 22(3), 305-313.

Shao, J. B., Yao, F. S., & Xie, M. (2023). Is time-constrained promotion actually effective? The moderating role of price discounts and previous online consumption experience. *International Journal of Services Technology and Management*, *28*(3-4), 159-184.

Song, M., Choi, S., & Moon, J. (2021). Limited time or limited quantity? The impact of other consumer existence and perceived competition on the scarcity messaging-Purchase intention relation. *Journal of Hospitality and Tourism Management*, *47*, 167-175.

Spence, M. (1973). Job market signaling the quarterly journal of economics, 87 (3). *MIT Press, August*, *355*, 374. https://doi.org/10.2307/1882010

Statista. (2023). *Market share of leading live streaming platforms in China 2022*. Statista GmbH

Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing, 77*(2), 203–220. https://doi.org/10.1016/S0022-4359(01)00041-0

Syntun. (2023). *Q1–Q3 2022 China live streaming e-commerce market analysis report*. Syntun Big Data.

Tan, L., Li, H., Chang, Y. W., Chen, J., & Liou, J. W. (2023). How to motivate consumers' impulse buying and repeat buying? The role of marketing stimuli, situational factors and personality. *Current Psychology*, *42*(36), 32524-32539.

Verhagen, T., & Van Dolen, W. (2011). The influence of online store beliefs on consumer online impulse buying: A model and empirical application. *Information & management*, *48*(8), 320-327.

Wells, J. D., Parboteeah, V., & Valacich, J. S. (2011). Online impulse buying: understanding the interplay between consumer impulsiveness and website quality. *Journal of the Association for Information Systems*, *12*(1), 3.

Wu, L., & Lee, C. (2016). Limited edition for me and best seller for you: The impact of scarcity versus popularity cues on self versus other-purchase behaviour. *Journal of Retailing*, *92*(4), 486-499.

Wu, Y., Xin, L., Li, D., Yu, J., & Guo, J. (2021). How does scarcity promotion lead to impulse purchases in the online market? A field experiment. *Information & Management*, *58*(1), 103283.

Yang, Z., & Peterson, R. T. (2004). Customer perceived value, satisfaction, and loyalty: The role of switching costs. *Psychology & Marketing*, *21*(10), 799-822.

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing, 52*(3), 2–22. https://doi.org/10.1177/002224298805200302

Zhou, R. (2024). The impact of scarcity promotions in live streaming e-commerce on purchase intention: the mediating effect of emotional experience. *Asia Pacific Journal of Marketing and Logistics*.