Impulse Buying in Live Stream Based on the Stimulus-Organism-Response Framework

(Pembelian Impuls dalam Strim Langsung Berdasarkan Rangka Kerja Stimulus-Organism-Response)

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ABSTRACT

Live stream commerce is the most effective method for online marketing and sales. The Malaysian government implementation of movement control order (MCO) and social distancing during the Covid-19 pandemic had a significant impact on consumer purchasing behaviour and ways of conducting business. Hence, this research aims to examine the factors which influence Malaysian consumers' impulse buying in live stream commerce. The Stimulus Organism Response Framework (SOR) is used to assess stimuli (live streamer attractiveness, expertise, scarcity, and promotion) that impact reactions (perceived enjoyment, urge to buy, and arousal) and subsequently influence response behaviour (live stream impulse buying). The total of 385 questionnaires were disseminated during the implementation of MCO 2.0 in 2021. The findings demonstrated that all hypotheses were significant. Perceived enjoyment, arousal, and urge to buy are associated with impulse buying in live stream. This study provides a deeper insight and identifies the key variables that influence live stream impulse buying in Malaysia. The findings would help businesses and marketers to formulate effective marketing strategies and to fill research gaps relating to live stream commerce.

Keywords: SOR; impulse buying; live stream; scarcity; arousal; urge to buy

ABSTRAK

Perdagangan strim langsung merupakan salah satu kaedah paling berkesan untuk pemasaran dan penjualan dalam talian, Perintah Kawalan Pergerakan (PKP) dan penjarakkan sosial yang dilaksanakan oleh kerajaan Malaysia semasa pandemik Covid-19 telah memberi kesan yang mendalam terhadap kelakuan pembelian pengguna dan cara-cara menjalankan perniagaan. Oleh itu, kajian ini bertujuan untuk mengkaji faktor-faktor yang mempengaruhi pembelian impuls dalam perdagangan strim langsung di Malaysia. Rangka kerja Stimulus Organism Response (SOR) digunakan untuk menilai rangsangan (live streamer attractiveness, expertise, scarcity dan promotion) yang memberi impak kepada tindak balas (perceived enjoyment, urge to buy dan arousal) dan seterusnya mempengaruhi kelakuan pembelian impuls strim langsung. Sejumlah 385 soal selidik telah diedarkan semasa pelaksanaan PKP 2.0 pada tahun 2021. Hasil kajian menunjukkan bahawa semua hipotesis adalah signifikan. Perceived enjoyment, arousal dan urge to buy dikaitkan dengan pembelian impuls dalam strim langsung. Kajian ini memberikan gambaran yang lebih mendalam tentang pembelian strim langsung di Malaysia dan mengenal pasti pembolehubah utama yang akan mempengaruhi pembelian impuls melalui video strim langsung. Penemuan ini akan membantu perniagaan dan para pemasar untuk merangka strategi pemasaran yang berkesan dan mengisi jurang penyelidikan dalam perdagangan strim langsung.

Kata kunci: SOR; pembelian impuls; strim langsung; kekurangan, rangsangan, dorongan untuk membeli

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INTRODUCTION

Live stream commerce is an innovative business model adopted by vendors, celebrities and influencers to sell their products and services online. Unlike typical TV shopping, live stream commerce can enhance customers' experiences and provide greater engagement between streamers and its viewers. Streamers may demonstrate or present product offerings to viewers and respond to enquiries in real-time. Streamers can also engage and reward viewers by providing extensive product evaluations, product demonstrations, discounts, promotions and giveaways. Meanwhile, viewers can enjoy the live stream and make purchases at their leisure time. The uniqueness of this business model might trigger viewers' impulse buying behaviour. Thus, it is not surprising that business owners have increased their sales through live streaming events compared to traditional commerce (Sun et al. 2019). Hence, many operators of e-commerce shopping platforms have integrated

live streaming into their business platforms to allow streamers to showcase their products and to boost sales (Chan et al. 2022).

Live stream commerce has grown in popularity as a mean of promoting products and services, particularly in China (Li et al. 2022). For instance, Taobao live stream commerce had generated a 400-billion-yuan revenue from promoting products and services via live stream (Ministry of Health Malaysia 2021). In addition, live stream commerce in China is anticipated to grow to 4.9 trillion yuan by 2023. In Malaysia, it is expected that the e-commerce market will expand at a compound annual growth rate (CAGR) of 15% from 2021 to 2025 (*eCommerce Market Malaysia - Data, Trends, Top Stores* n.d.). However, live stream commerce is still new for many businesses in Malaysia and is relatively understudied.

The Covid-19 pandemic resulted in changes on consumer behaviour and lifestyle. Consumers have shifted to online shopping for food, clothes, personal care products and other daily necessities as a result of the pandemic and movement control order (MCO). In Malaysia, live stream shopping has increased by 53% in the first quarter of 2021 as compared to the fourth quarter of 2020 (*Livestream Shopping: The Future of E-commerce?* 2021). The MCO has contributed to the spike since most businesses were unable to operate during the lockdown. As a result, live stream commerce has emerged as a viable option to businesses to reach out to consumers. Furthermore, live streaming sessions alleviate consumers' difficulties in distinguishing between the different products offered as well as allowing them to obtain trustworthy product information and usage instructions from the streamer.

As discussed above, live stream commerce is not only a new trend but also an opportunity for new normal in businesses. Nonetheless, there have been limited studies on impulse buying in Malaysian live stream commerce. Impulse buying is typically done at the spur of the moment while browsing through products. Past research showed that impulse buying can increase sales of goods. However, it is uncertain as to which factors may lead to increased impulse buying in live stream commerce. Hence, the aim of this research is to fill this research gap by investigating the factors that contribute to impulse buying during and after live stream sessions.

The Stimulus Organism Response (SOR) framework is chosen for this research as it has been widely used to examine online consumer behaviour. It is a well-organised framework for structuring constructs to investigate how stimulus affects organism, which in turn affect consumer response (Chen et al. 2021). However, to the best of the researcher's knowledge, the SOR framework has not been widely used to explain the factors influencing impulse buying in live stream commerce. Previous studies focused on a direct relationship between stimuli and response. For example, Herzallah et al. (2022) investigated the impact of trust, attitude, perceived ease of use and perceived usefulness on Instagram commerce; Liu (2022) examined the influence of legitimacy issues on live stream commerce purchase intention in China; and Chan et al. (2022) adopted Uses and Gratification Theory to explain Malaysian live stream commerce purchase intention. Although the factors promoting impulse buying, such as website characteristics, gift-giving, trust, product characteristics, diversity seeking and social influence had been examined, these research were conducted in relation to online buying rather than live stream commerce (Sun et al. 2019; Zahari et al. 2021). Furthermore, factors such as attractiveness, expertise, scarcity, and promotion in influencing consumer impulse buying in live stream commerce have yet to be fully tested and validated, particularly in Malaysia. Due to the surge in the use of live stream commerce during the Covid-19 pandemic, it becomes necessary to conduct this study to resolve the literature and practical implementation gaps. The findings of this study would widen understanding and bring new insights into live stream commerce in Malaysia and support industry players to set new strategies to guarantee their sustainability in live stream commerce.

This paper begins with a literature review on impulse buying, SOR framework and hypothesis development. The next section provides explanation on the methodology adopted in this study followed by data analysis and discussion of results. This paper concludes with the theoretical and practical implications together with limitations and recommendations for future researchers.

LITERATURE REVIEW

IMPULSE BUYING

Impulse buying is regarded as a compelling, unplanned, sudden, and hedonic buying behaviour characterised by a lack of consideration of alternatives and accessible information (Zahari et al. 2021). Consumer emotions, which have limited cognitive control, or spontaneous activity, will drive impulsive buying. This behaviour is often triggered by an appealing product, which encourages unplanned buying among consumers in e-commerce without further consideration of their financial means and other aspects in justifying such a purchase (Akram et al. 2018). Thus, when a purchase is done at the spur of the moment, it is referred as impulse buying behaviour. According to the SOR framework, response refers to the consequences of a consumer's reactions to impulse buying (Xu et al. 2020). It is an approaching behaviour that will have positive effects in certain areas such as online communication and buying behaviour. Thus, we defined live stream impulse buying as a sudden and immediate unplanned purchase during or after a live stream session, with no prior shopping intention.

STIMULUS ORGANISM RESPONSE (SOR) FRAMEWORK

Woodworth, 1929 as cited in Moore (1996) refined the traditional stimulus-response-theory by including the organism element between stimulus and response which led to introduction of the SOR framework. Subsequently, Mehrabian and Russell argued that environmental sensory factors might trigger emotional responses (Song et al. 2021). As a result, the SOR framework was further refined by including these factors to explain how the external environment as a stimulus affects people's internal appraisals and influences their behaviour. The SOR framework was also comprehensive and provides a strong theoretical support for research in impulse buying (Huang 2016). As such, the SOR framework has been widely used to explore online users' behaviour (Luqman et al. 2017) and retail (Hew et al. 2018), making it appropriate to be used to examine impulse buying behaviour in live stream commerce (Chan et al. 2017).

A stimulus is defined as a factor in the external environment that causes a person' organisms and internal feelings to change such as desire, perception, belief and emotion (Song et al. 2021). According to Lee and Chen (2021), stimuli are external elements that affect the internal states of organisms when exposed to them. Thus, the stimulus in live stream commerce refer to attractiveness and expertise of a streamer to stimulate viewers to watch, continue watching, and engage with him. Meanwhile, scarcity and promotion are the factors that trigger organisms.

The SOR framework defines an organism as an intermediate state of affective and cognitive assessments that mediates the effect of stimulus on an individual's response (Wu & Li 2018). It controls the final behaviour in response to the stimulus and serves as a link between stimulus and behaviour (Lee & Chen 2021). Xu et al. (2020) stated that an individual's emotional responses to an external stimulation are referred to as their affective states. Cognitive state refers to the cognitive process involved when an individual is exposed to a stimulus (Xu et al. 2020). For instance, perceived enjoyment and arousal will be affective states (Chan et al. 2017), whereas the urge to buy will be a cognitive state, a reaction to the stimuli. Furthermore, organism is an intermediate component that intervenes between stimuli and response in the whole consumer buying process (Luqman et al. 2017).

The outcome of a reaction is a response. According to Xu et al. (2020), consumers' ultimate decisions and behaviours are based on affective and cognitive states which referred as responses. In this study, impulse buying behaviour was adopted to measure live stream commerce audience's reaction to emotion.

HYPOTHESIS DEVELOPMENT

RELATIONSHIP BETWEEN PERCEIVED ENJOYMENT AND IMPULSE BUYING

Perceived enjoyment is an individual's sense of excitement and joy when interacting with a streamer in a live stream. Badgaiyan and Verma (2014) claim that shoppers who highly enjoy shopping will tend to stay longer in-store searching for products and are expected to have a stronger tendency to buy impulsively. A study conducted on live stream shopping in China by Ma (2021) found that perceived enjoyment has a significant association with live stream impulse buying. This is because consumers' pleasant shopping experiences will establish a brand image, which will lead to impulse buying (Hashmi et al. 2020). Likewise, this relationship has also been proven by Lee and Chen (2021) and Karim et al. (2021). Karim et al. (2021) explain that when a viewer pursues enjoyment and is satisfied, he would consider himself receiving pleasure, which triggers him to indulge in impulse buying behaviour.

H_1 Perceived enjoyment is significantly correlated with impulse buying

RELATIONSHIP BETWEEN AROUSAL AND IMPULSE BUYING

Arousal has been consistently validated in prior studies in the context of consumer behaviour (Chan et al. 2017). Arousal is a key emotional state that influences people's avoidance or motivation to approach a consumption environment (Xu et al. 2020). Xu et al. (2020) states that arousal is the degree to which a viewer feels and is aroused by a presenter. Thus, it is the extent to which a live stream viewer feels captivated or inspired by the streamer while viewing the live broadcast (Wu et al. 2021). Viewers who are greatly aroused and stimulated will be eager to participate in the live stream and this prolonged exploration may lead to impulse buying. Furthermore, viewers are drawn in to engage in impulse buying by taking advantage of exclusive deals that are only available during the particular live stream session. Besides, the pleasant experience of the live stream is likely to arouse viewers, which will lead to impulse buying (Xu et al. 2020). Thus, arousal is associated with impulse buying.

H_2 Arousal is significantly correlated with impulse buying

RELATIONSHIP BETWEEN THE URGE TO BUY AND IMPULSE BUYING

An urge to buy arises when a customer experiences a sudden, intense, and continuous want to purchase something (Akram et al. 2018). According to Huang (2016), the urge to buy is not the same as impulse buying,

though it is an often-used surrogate measure. Verhagen and Van Dolen (2011) exert that a person who has impulse buying behaviour must first have an emotional medium, which is the urge to buy. Thus, a person will first experience the urge to buy before the actual impulse buying behaviour occur (Xiang et al. 2016). As a result, the cause of impulsive purchasing behaviour is the urge to buy. Hsu (2020) has also proven that the urge to buy has a substantial impact on Taiwanese impulse buying on social media. In brief, the urge to buy is the driving force behind impulse purchases (Leong et al. 2018).

H$_3$ Urge to buy is significantly correlated with impulse buying

RELATIONSHIP BETWEEN LIVE STREAMER ATTRACTIVENESS AND PERCEIVED ENJOYMENT

In this study, attractiveness refers to how viewers perceive the appearance, personality and talent of a streamer during a live stream (Lee & Chen 2021). According to Heo et al. (2020) and Lou and Yuan (2019), a streamer's attractiveness is formed by his familiarity with the products sold, his physical features, likability and similarities with his audience. Viewers might also be drawn in by his good sense of humour, attractive appearances and positive attitude. This is because an attractive live streamer can become an influential social actor, thereby stimulating more views, pleasure and purchase of products and services (Xu et al. 2020). The study conducted by Lee and Chen (2021) has confirmed that attractiveness of a streamer has a significant influence on Chinese consumers' perceived enjoyment in live stream commerce. It would also result in a high degree of good impression among viewers, which in turn leads to a purchase (Lee & Chen 2021).

H$_4$ Attractiveness is significantly correlated with perceived enjoyment

RELATIONSHIP BETWEEN EXPERTISE AND PERCEIVED ENJOYMENT

Expertise is referred to as the ability, experience, status, accomplishment and understanding of a specific subject (Chan et al. 2022; Heo et al. 2020). A person who is an expert in a certain field and provides excellent knowledge can stimulate more engagement with live stream viewers (Lou & Yuan 2019). Thus, expertise is defined in this study as the experience, proficiency, ability, achievements, status and knowledge of a given product, brand and subject of a live streamer. It has been proven that a live streamer's expertise can significantly influence Chinese consumers' perceived enjoyment of a live stream (Lee & Chen 2021). Previous studies had shown that expertise increases consumers' awareness, pleasant experiences, and perceived enjoyment. Besides, the streamer's expertise can reduce information asymmetry and develop interpersonal relationships with his viewers.

H$_5$ Expertise is significantly correlated with perceived enjoyment

RELATIONSHIP BETWEEN SCARCITY AND URGE TO BUY

Scarcity refers to a customer's awareness of an item's limited availability, as well as the restricted time and incentives associated with it (Akram et al. 2018). Consumers are threatened by a shortage of products, resources, or services to satisfy their needs and desires (Hamilton 2021). Thus, in this study, scarcity refers to a consumer's recognition of a product's limited availability, quantity and/or incentives promoted in a live stream. Wu et al. (2021) stresses that scarcity messages, such as time-limited scarcity and a limited quantity of items is always incorporated in marketing efforts to boost sales. Scarcity has been proven to be the cause of the urge to buy (Song et al. 2015). It was also confirmed to have significant impact on urge to buy on Facebook Live in Thailand (Leeraphong & Sukrat 2018). Meanwhile, a study was conducted in the United States showed that mobile promotions with a scarcity message has increased the likelihood of an urge to buy and encourage consumers to make quick and unplanned purchases (Sun et al. 2022). Similarly, scarce supply was discovered to be an effective way to increase the urge to buy and make impulse buying decisions (Song et al. 2015).

H$_6$ Scarcity is significantly correlated with the urge to buy

RELATIONSHIP BETWEEN PROMOTION AND AROUSAL

Promotion is a tool used to persuade buyers to purchase specific items in a short period of time (Akram et al. 2018; Lo et al. 2016). Coupons, discounts, buy-one-get-one deals, and special prices are examples of incentives offered through promotions. The concept of quick reward in relation to promotion is similar to that of impulse buying, in which hedonic and utilitarian benefits evoke consumers to make impulsive buying (Akram et al. 2018). The promotional activities have an immediate and direct impact on consumers' purchasing behaviour (Akram et al. 2018), which triggers arousal due to the belief that the products offered are less costly (for low-priced products) or to seek advantage of instant rewards and opportunities provided (for high-priced products). When a promotion is paired with a sense of competitiveness, such as limited promotion, the consumer senses direct competition with other consumers, which increases arousal (Wu et al. 2021).

H$_7$ Promotion is significantly correlated with arousal

PROPOSED RESEARCH MODEL

In this study, the SOR framework is used, and the research model is depicted in Figure 1. The stimulus is referred to as the trigger. This study identifies live streamer attractiveness, expertise, promotions, and scarcity as stimuli. According to Chan et al. (2017), there is evidence to imply that a consumer's emotional state influences purchasing decision process. Perceived enjoyment, arousal and urge to buy are the impact of viewers' affective and cognitive states on live stream impulse buying (Zhang et al. 2020). Meanwhile, the response, which is live stream impulse buying is the dependent variable. Live streamer attractiveness and expertise are regarded as stimuli for the viewers to experience perceived enjoyment and continue to engage in a live stream. Promotion is a strategy for motivating or stimulating a viewer; in other words, promotional sentiment can be used to elicit affective emotion, which in turn triggers arousal (organism), which leads to impulse buying (response). For instance, promotional activities offer during live stream will trigger a consumer's affective emotion that a good deal is being offered. Similarly, according to the concept of Rational Appeal in marketing, the use of strategies involving limited quantities or editions would trigger the cognitive emotion of consumers, i.e., the urge to buy immediately. Hence, scarcity stimulates a sense of paucity and competitiveness for a product or service, resulting in an urge to buy (organism).

METHODOLOGY

RESEARCH PHILOSOPHY AND DESIGN

The positivism philosophy is used in this study, as the outcomes and results are observable and quantifiable. Deductive research is also used in this study as this type of research is frequently associated with positivism philosophy (Sekaran & Bougie 2016). For theory generalisation, hypotheses were developed based on existing relevant theories and research findings.

A self-administered survey was used in this cross-sessional study to measure responses. The measurements used in this study were adapted from existing literature (see Table 1). Modest changes were made to accommodate the setting of this study. For instance, phrases such as "attractiveness of live streamer", "promotional offer in live stream", "purchase through live stream is exciting", were added to the original questions to ensure that the survey questions were relevant to live stream commerce.
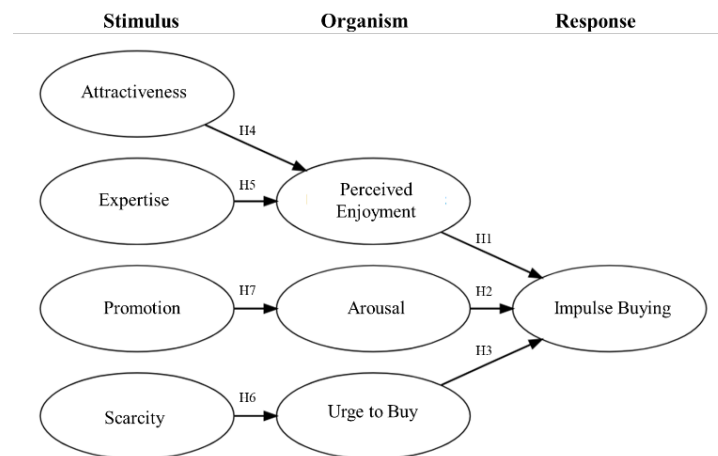

FIGURE 1. Research model

TABLE 1. Construct measurement

Construct	Number of items	Source
Attractiveness	4	Lee and Chen (2021)
Expertise	4	Lee and Chen (2021)
Promotion	3	Badgaiyan and Verma (2015)
Scarcity	4	Asiah et al. (2021)
Perceived enjoyment	4	Lee and Chen (2021)
Arousal	4	Xu et al. (2020)
Urge to buy	4	Lee and Chen (2021)
Impulse buying	4	Xu et al. (2020)

Questions were also pre-tested, validated, and confirmed for clarity. Two academic who specialise in marketing were invited to comment on the question of construct representativeness and clarity. The suggestions offered by them were followed where questions and examples were added to fit the local context and to assist respondents to better comprehend the questions and provide the most representative answers. A screening question was also included in the questionnaire to verify that the right targeted respondents were invited to participate in this research.

A pilot test was undertaken by distributing the questionnaire to a targeted group of live stream viewers for internal reliability testing. For this study's pilot test, 41 set of questionnaires were obtained. From the result, it can be concluded that all the variables have achieved Cronbach's alpha value of more than 0.8, indicating high internal consistency.

SAMPLING AND DATA COLLECTION

This study focused on Malaysian live stream viewers who shop on various social media platforms (e.g., Facebook, Instagram, and TikTok) and online shopping sites (e.g., Lazada Lazlive and Shoppe Live). The targeted respondents must be Malaysian and have prior experience(s) or have purchased products and services via live stream. There was no list of participants from which samples could be drawn. Since the targeted population was large and the sampling frame was unavailable, non-probability sampling and convenience sampling were employed. Convenience sampling has the advantage of being quick and simple to deliver results as it easy to engage people from a close population group.

A minimum of 384 samples is required for data analysis. This is because a sample size of 384 would be able to represent a population of more than 1,000,000 people (Krejcie & Morgan 1970). A large sample size will reduce the likelihood of errors when generalising the target population (Sekaran & Bougie 2016). However, to determine the sample size with adequate accuracy to make a judgement, an assessment of the sample size using Cohen's statistical power analysis was conducted. Thus, 77 samples were established using the G*Power analysis tool with a medium effect size of 0.15, 0.8 statistical power, 0.05 alpha, and three arrows pointing to a dependent variable.

An electronic questionnaire was developed using Google form and distributed to respondents. Data collection was conducted during the implementation of MCO in 2021. Besides, a Facebook post was created to get a larger number of responses. A total of 426 questionnaires were received. After removing the questionnaires which contained response bias and outliers, there were only 385 cases that were valid for data analysis.

DATA ANALYSIS

The Partial Least Square Structural Equation Modelling (PLS-SEM) technique and the SEMinR software package were used for data analysis. PLS-SEM is a variance-based SEM path modelling technique capable of estimating complex model and testing theoretical frameworks from a predictive perspective (Hair et al. 2021). SEMinR is also a powerful R language syntax for specifying and estimating variance-based structural equation models. The R package is able to achieve the same results as other proprietary software such as Smart-PLS (Chuah et al. 2021; Hair et al. 2021).

RESULTS

DEMOGRAPHIC PROFILE

There is a total of 385 respondents, of whom 197 (51%) are males and 188 (49%) are females (see Table 2). There are 43.64% of the respondents who are under the age group of 24, 31.69% are between the ages of 25 and 34, 19.48% are between 35 and 44 years old, 4.42% are between 45 and 54 years old, and lastly, 0.78% are over 55 years old. Most of the respondents are employed, amounting to 53.77% while students representing 32.47% of the respondents. When questioned about their duration of engagement in live stream buying, 47.79% stated that they had less than one year of experience and 32.99% stated that they had one to two years of experience in live stream online buying. This is most likely due to the fact that live stream buying has only become more popular and common in Malaysia during the last two years due to Covid-19 pandemic. Therefore, only 9.09% and 10.13% of the respondents experienced live stream buying for two to four years and over four years, respectively. Furthermore, 222 respondents (57.66%) watched live stream videos at least once per week, 109 respondents (28.31%) watched such videos one to three times a week, followed by 38 respondents (9.87%) who watched these videos four to six times per week and 16 respondents (4.16%) watched these videos more than six times per week. However, the purchase frequency was low as most of the respondents made fewer than three purchases via live stream in the past six months when they completed the survey (80.78%).

COMMON METHOD BIAS

A full multicollinearity test was chosen as the approach for dealing with common method bias (Kock 2015). A value of greater than 3.3 for the variance inflated factor (VIF) suggests the presence of common method bias. The results showed that VIF values were less than 2, indicating that the constructs were not highly correlated with others (see Table 3).

TABLE 2. Summary of respondents' demographic profile (N=385)

Attribute	Value	Frequency	Percentage (%)
Gender	Male	197	51.17
	Female	188	48.83
Age	Below 24	168	43.64
	25 - 34	122	31.69
	35 - 44	75	19.48
	45 - 54	17	4.42
	Above 55	3	0.78
Occupation	Employed	207	53.77
	Unemployed	14	3.64
	Self-employed	32	8.31
	Housewife	5	1.30
	Retired	2	0.52
	Students	125	32.47
Year of experience (engage in live stream buying video)	Less than 1 year	47.79	47.79
	1 – 2 years	32.99	32.99
	2 – 4 years	35	9.09
	More than 4 years	39	10.13
Frequency of watching/engagement in live stream buying video	At least once a week	222	57.66
	1 – 3 times per week	109	28.31
	4 – 6 times per week	38	9.87
	More than 6 times per week	16	4.16
Average Time spent on live stream buying video (per week)	Less than 1 hour	216	56.10
	1 – 3 hours	131	34.03
	4 – 6 hours	30	7.79
	More than 6 hours	8	2.08
Average buying frequency for the past six months	Less than 3 times	311	80.78
	3 – 6 times	65	16.88
	More than 6 time	9	2.34

TABLE 3. The result of the VIF

	Perceived Enjoyment	Impulse Buying
Attractiveness	1.152	
Expertise	1.152	
Perceived Enjoyment		1.957
Arousal		1.966
Urge To Buy		1.357

MEASUREMENT MODEL ASSESSMENT

Table 4 summarises the measurement model assessment in our research model. The factor loading, reliability test, RhoA and CR were above the threshold value. Since all constructs AVE 'values were above the threshold value of 0.5, convergent validity was established. Meanwhile, discriminant validity is established when each construct is not highly correlated with others in the model. Tables 5 and 6 show the Fornell and Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio results and indicate that discriminant validity was established.

STRUCTURAL MODEL ASSESSMENT

Table 7 summarises the path coefficient, t-value, and p-value with 5000 samples using the bootstrapping. All hypotheses were significant. Figure 2 depicts the structural model of this study. Perceived enjoyment (β = 0.168, p-value < 0.05), arousal (β = 0.251, p-value < 0.05) and urge to buy (β = 0.426, p-value < 0.05) were found to have a positive significant relationship with impulse buying. Among these three predictors, the urge to buy had the greatest impact on impulse buying. The results also showed that hypotheses H_4 and H_5 were supported. Attractiveness (β = 0.252, p-value < 0.05) and expertise (β = 0.172, p-value < 0.05) showed a positive significant relationship with perceived enjoyment. Meanwhile, scarcity (β = 0.318, p-value < 0.05) was found to be positively associated with the urge to buy,

TABLE 4. Reliability, Composite Reliability (CR) and Average Variance Extracted (AVE)

Construct	Item	Loading	alpha	rhoC	AVE	RhoA
Attractiveness	Attrac1	0.906	0.890	0.923	0.749	0.928
	Attrac2	0.844				
	Attrac3	0.846				
	Attrac4	0.865				
Expertise	Exp1	0.863	0.900	0.928	0.763	0.953
	Exp2	0.837				
	Exp3	0.888				
	Exp4	0.904				
Promotion	Promo1	0.889	0.897	0.935	0.828	0.909
	Promo2	0.926				
	Promo3	0.915				
Scarcity	Scarc1	0.838	0.860	0.905	0.704	0.868
	Scarc2	0.852				
	Scarc3	0.821				
	Scarc4	0.844				
Perceived Enjoyment	PE1	0.889	0.930	0.950	0.827	0.931
	PE2	0.923				
	PE3	0.910				
	PE4	0.915				
Arousal	Arou1	0.867	0.911	0.937	0.789	0.912
	Arou2	0.873				
	Arou3	0.896				
	Arou4	0.916				
Urge To Buy	Urge1	0.906	0.940	0.957	0.847	0.943
	Urge2	0.924				
	Urge3	0.926				
	Urge4	0.926				
Impulse Buying	Impulsebuy1	0.913	0.937	0.955	0.840	0.937
	Impulsebuy2	0.914				
	Impulsebuy3	0.921				
	Impulsebuy4	0.919				

TABLE 5. Discriminant Analysis – Fornell and Larcker Criterion

	1	2	3	4	5	6	7	8
Attractiveness	0.866							
Expertise	0.363	0.873						
Promotion	0.245	0.252	0.910					
Scarcity	0.097	0.086	0.362	0.839				
Perceived Enjoyment	0.315	0.263	0.460	0.309	0.909			
Arousal	0.342	0.271	0.492	0.327	0.679	0.888		
Urge To Buy	0.174	0.210	0.544	0.318	0.468	0.472	0.920	
Impulse Buying	0.216	0.208	0.554	0.295	0.538	0.566	0.623	0.917

Note 1: Fornell and Larcker Criteria table reports the square root of AVE on the diagonal and constructs correlations on the lower triangle.

TABLE 6. Discriminant analysis – HTMT

	1	2	3	4	5	6	7	8
Attractiveness								
Expertise	0.405							
Promotion	0.265	0.272						
Scarcity	0.112	0.089	0.405					
Perceived Enjoyment	0.333	0.268	0.502	0.342				
Arousal	0.365	0.284	0.539	0.363	0.737			
Urge To Buy	0.184	0.210	0.586	0.348	0.498	0.508		
Impulse Buying	0.227	0.210	0.600	0.324	0.576	0.612	0.662	

Note 1: Below HTMT$_{.85}$

TABLE 7. Bootstrapped path coefficient

	Hypothesis	Beta	Std Error	T-values	P-value	LLCI	ULCI
H$_1$	Perceived Enjoyment -> Impulse Buying	0.168	0.060	2.813	0.003	0.055	0.284
H$_2$	Arousal -> Impulse Buying	0.251	0.066	3.804	0.000	0.118	0.374
H$_3$	Urge To Buy -> Impulse Buying	0.426	0.052	8.199	0.000	0.323	0.525
H$_4$	Attractiveness -> Perceived Enjoyment	0.252	0.060	4.185	0.000	0.137	0.371
H$_5$	Expertise -> Perceived Enjoyment	0.172	0.057	3.024	0.001	0.068	0.288
H$_6$	Scarcity -> Urge To Buy	0.318	0.052	6.111	0.000	0.219	0.423
H$_7$	Promotion -> Arousal	0.492	0.044	11.128	0.000	0.403	0.579

*p < 0.05, **p < 0.01, ***p < 0.001
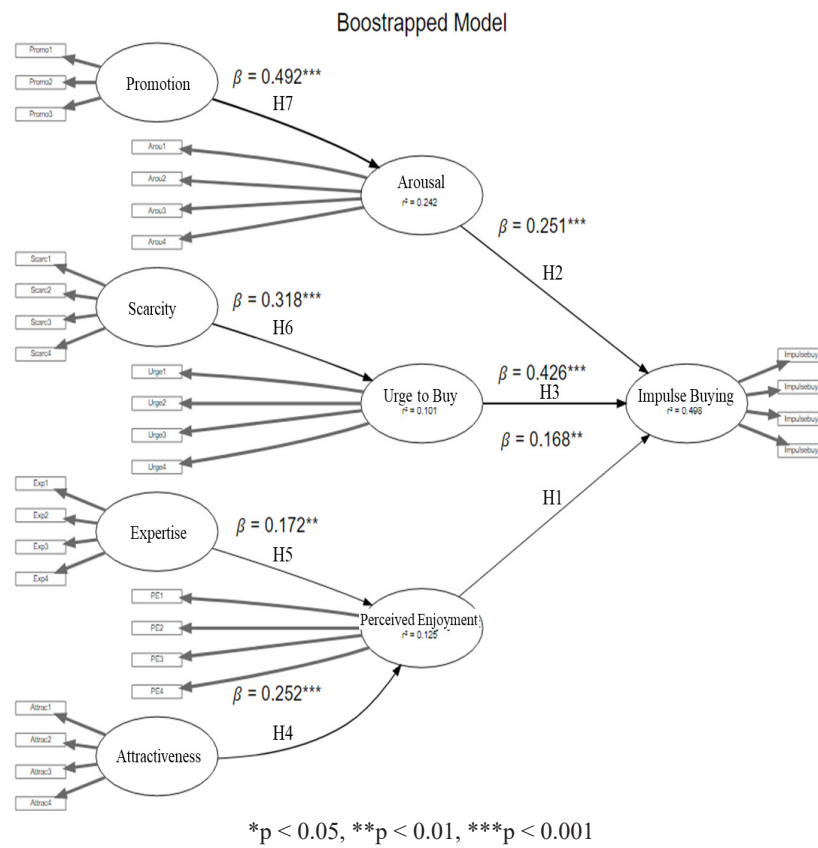
FIGURE 2. Structural model

TABLE 8. R-square (R^2)

	Perceived Enjoyment	Arousal	Urge To Buy	Impulse Buying
R^2	0.125	0.242	0.101	0.498

Note 1: 0.02 – weak, 0.13 – moderate, 0.26 – substantial (Cohen 1988)

TABLE 9. F-square (f^2)

	Perceived Enjoyment	Arousal	Urge To Buy	Impulse Buying
Attractiveness	0.063			
Expertise	0.029			
Promotion		0.319		
Scarcity			0.113	
Perceived Enjoyment				0.029
Arousal				0.064
Urge To Buy				0.266

Note 1: Small effect size ▢ 0.02, Moderate effect size ▢ 0.15, Strong effect size ▢ 0.35

while promotion (β = 0.492, p-value < 0.05) was found to be positively associated with arousal.

The model's predictive power for a specific construct can be determined by the endogenous R-squared (R^2) value, which is presented in Table 8. Perceived enjoyment, arousal and the urge to buy accounted for 49.8% of the variance in explaining impulse buying. Meanwhile, the R^2 for perceived enjoyment and urge to buy were relatively low, at 0.125 and 0.101 respectively. Lastly, the R^2 for arousal was 0.242.

Table 9 shows the effect sizes for endogenous constructs and corresponding exogenous constructs. According to Cohen (2013), the f^2 values of 0.02, 0.15 and 0.35 represent small, mediocre and large degrees of effect size. The results showed that both attractiveness (f^2 = 0.063) and expertise (f^2 = 0.029) had a small effect size on perceived enjoyment. Promotion (f^2 = 0.319) had a mediocre effective size on arousal, while scarcity (f^2 = 0.113) had a small effect size on urge to buy. Lastly, perceived enjoyment (f^2 = 0.029) and arousal (f^2 = 0.064) had a small effect size as compared to the urge to buy (f^2 = 0.266) which had a mediocre effect size on impulse buying.

DISCUSSION

According to the findings of this study, perceived enjoyment had a substantial association with live stream impulse buying (Hypothesis 1). Similar results were attained by Lee and Chen (2021) and Zhang et al. (2020). Previous studies have also found that customers' perceived enjoyment of online retail and social commerce platforms influences consumers' desire to make impulse buying (Karim et al. 2021; Xiang et al. 2016). Hence, this finding concludes that viewers are more inclined to make impulse buying through live stream commerce

when they have a high degree of perceived enjoyment. However, in this study, it was found that compared to the other predictors, such as arousal (β = 0.251) and the urge to buy (β = 0.426), perceived enjoyment (β = 0.168) was reported to be the weakest predictor of impulse buying. Furthermore, it was discovered that perceived enjoyment (f^2 = 0.029) and arousal (f^2 = 0.064) had a small effect size greater than 0.02, whereas urge to buy (f^2 = 0.266) had a moderate effect size.

The association between arousal and impulse buying was found to have a positive significant relationship (Hypothesis 2). This finding is consistent with the findings of Leong et al. (2018), Xu et al. (2020), Wu et al. (2021) and Li et al. (2021), which found that the higher the arousal, the greater the likelihood of live stream impulse buying. The aroused consumer will be aggressively engaging with the streamer to obtain further details about the recommended products and services.

Based on the findings, Hypothesis 3 which stipulates that the urge to buy us significantly correlated with impulse buying is also supported. The result is consistent with those of Xiang et al. (2016), who discovered that the urge to buy influences impulse buying behaviour on a social commerce platform in China, and Huang (2016), who found that the urge to buy impacts Taiwanese consumers online impulse buying. A person will first experience the urge to buy something before the actual impulse purchase behaviour sets in (Xiang et al. 2016).

This study also confirms that attractiveness of a live streamer has a significant association with perceived enjoyment (Hypothesis 4). Previous research has shown that the attractiveness of a live streamer can improve consumers' impressions of the promoted products and services, thus leads to increased sales (Bergkvist & Zhou 2016). Our findings are supported by Lee and Chen (2021) and Lou and Yuan (2019). Since the attractiveness of a live streamer would influence viewers' emotional states,

the latter would be more inclined to purchase specific brands and products promoted by the live streamer (Lou & Yuan 2019).

The result shows that Hypothesis 5 which provides that that expertise positively affects perceived enjoyment is supported and is consistent with past studies by Lee and Chen (2021). Viewers will acquire a sense of perceived enjoyment while watching live stream and are more inclined to interact with live streamers who ae more knowledgeable about products and brands (Lou & Yuan 2019). It enhances engagement and fun when a live streamer has the expertise and knowledge to effectively convey information about the products and services. Another plausible answer is that the majority of the products sold are experienced products. The viewers will be delighted by the streamer's product knowledge and expertise.

The result of Hypothesis 6 confirms that scarcity has a significant association with the urge to buy. This result is in line with Leeraphong and Sukrat (2018) and Akram et al. (2018), who found that scarcity influenced Thai people's urge to buy on Facebook Live. Meanwhile, according to (Sun et al. 2022), scarcity messages will increase the likelihood of an urge to buy and encourage consumers to make quick and impulse buying. Scarcity creates a sense of urgency for consumers during live streams, resulting in an incentive to buy and spend beyond their expectation due to paucity of products and services offered. Besides, scarcity also creates a sense of uncertainty among the viewers. Viewers are concerned about their ability to purchase a product offered in live stream owing to limited quantities or time-limited promotions.

Lastly, it is discovered that promotion has a substantial association with arousal (Hypothesis 7). This result is consistent with the results obtained by Wu et al. (2021). Marketing campaigns often come together with attractive promotions, making it almost impossible for an aroused consumer to resist a deal. Besides, when promotion is combined with perceived competitiveness, the consumer's perceived rivalry with other consumers will trigger arousal. Thus, when promotions are offered during live stream, viewers would be excited and aroused by attractive deals, which in turn would trigger impulse buying.

THEORETICAL CONTRIBUTIONS

This study adds to the development of the SOR framework. It better explains the organism's antecedent factors, as well as how arousal, the urge to buy, and perceived enjoyment influence impulse buying in live stream commerce. The results indicate that the urge to buy has the greatest impact on live stream impulse buying. This findings enhance the amount of literature on live stream impulse buying, which is currently limited in the Malaysian context.

MANAGERIAL IMPLICATIONS

As live stream commerce is still in its early stages in Malaysia, there is still room for development. The findings will help live stream platform operators, businesses, online sellers and marketers in developing future live stream sales and marketing strategies to attract consumers, build engagement and stimulate impulse buying behaviour. The following are some of the study's implications on live stream commerce.

The findings confirm that perceived enjoyment, arousal, and the urge to buy are associated with live stream commerce impulse buying. Notably, the urge to buy has a high degree of variance (49.8%) in determining live stream commerce impulse buying. This infers that the ability to create or generate an urge to buy will eventually cultivate actual impulse purchase. Product recommendations that are highly relevant to targeted viewers can elicit strong emotions and excitement (perceived enjoyment and arousal) and awaken their desire to buy. The ability to produce an engaging and lively presentation to enhance enjoyment of the viewers is also vital in triggering an urge to buy.

Both attractiveness and expertise of a live streamer positively affect perceived enjoyment, which in turn influence live stream commerce impulse buying. This may also increase traffic to live streamer brand's social pages and generate a two-way and personalised conversations between the customers and himself. As a result, in promoting a product or service, live stream operators or vendors should consider the attractiveness and expertise of the potential streamer in devising promotion strategies. In addition, to attract and build followers and to improve real-time engagement with viewers, marketers may consider inviting micro-influencers and celebrities to share their experiences in relation to the products in order to promote pleasant experience among viewers. This would then lead to higher chance in impulse buying of the products.

Due to increased product competitiveness in the market, the scarcity message has a substantial impact on the urge to buy. By offering a limited quantity of products or services, consumers will have the urge to indulge in impulse buying. As seen in the discussion above, the greater the urge, the greater the likelihood of impulsive buying. Thus, vendors may extend marketing messages such as limited offers in relation to their bestselling products. This could include limited time and/or quantity offers and any other special offers which can trigger viewers' urge to buy.

Promotion was found to be one of the most effective ways to elicit arousal, which would then lead to live stream commerce impulse buying. Live stream platform operators, businesses, online sellers and marketers can leverage on data analytics provided by streaming platforms to determine their consumer segment and taste for personalised marketing campaigns. They can attract audiences to participate in group buying during sessional

promotions to increase the amount of impulse buying. Besides, scarcity when coupled with promotion, such as Double 11 and any online shopping carnival, have the potential to double the effect of these two elements and contribute to even more impulse buying. Furthermore, different promotional policies for loyal customers and new followers based on frequency of purchase can also stimulate impulse buying behaviour. Lastly, strategies such as cross-selling and upselling could be used to increase arousal and induce impulse buying.

CONCLUSION

The pandemic has brought significant changes on consumer purchase behaviour. Particularly, live stream commerce has become one of the main options for consumers to source for goods and services. However, there are limited studies of live stream impulse buying in the Malaysian context., Similar studies on impulse buying merely focused on system and website features, and online purchasing. Furthermore, though the SOR framework is appropriate for examining live stream commerce, it is not widely adopted yet. Therefore, SOR framework was used in this study to fill the research gap by investigating factors that trigger Malaysian consumers' impulse buying behaviour in live stream commerce. This study confirms that perceived enjoyment, the urge to buy and arousal have a significant relationship with live stream commerce impulse buying. It also reveals that the urge to buy is a vital factor in triggering impulse buying. The relationships between the antecedent factors that trigger arousal, the urge to buy, and perceived enjoyment, which in turn influence impulse buying in live stream commerce in Malaysia, have been explored and given a better understanding. The findings of this study have implications for future researchers, marketers, businesses, and the government. It also broadens knowledge and provides greater insights into live stream commerce in Malaysia and supports industry players in identifying key factors to develop their businesses and marketing strategies to sustain live stream commerce.

Since data were obtained during the implementation of MCO in Malaysia, there might be a bias in generalising the theory because environmental factors associated with Covid-19 can cause dramatic changes in consumer behaviour and affect the impact on impulse buying. Future studies can consider longitudinal studies to better generalise the theoretical framework. Secondly, the vast majority of the respondents in this study are working adults and students. For better generalisability, future researchers may attempt to acquire a more balanced background of his respondents in terms of age and employment.

REFERENCES

Akram, U., Hui, P., Kaleem Khan, M., Tanveer, Y., Mehmood, K. & Ahmad, W. 2018. How website quality affects online impulse buying: Moderating effects of sales promotion and credit card use. *Asia Pacific Journal of Marketing and Logistics* 30(1): 235–256.

Akram, U., Hui, P., Khan, M.K., Yan, C. & Akram, Z. 2018. Factors affecting online impulse buying: evidence from Chinese social commerce environment. *Sustainability (Switzerland)* 10(2): 352.

Asiah, N., Azrin, M., Helmi, M. & Shah, S. 2021. The panic buying behavior of consumers during the COVID-19 pandemic : examining the influences of uncertainty, perceptions of severity, perceptions of scarcity, and anxiety. *Journal of Retailing and Consumer Services* 62: 1-12.

Badgaiyan, A.J. & Verma, A. 2014. Intrinsic factors affecting impulsive buying behaviour-evidence from India. *Journal of Retailing and Consumer Services* 21(4): 537–549.

Badgaiyan, A.J. & Verma, A. 2015. Does urge to buy impulsively differ from impulsive buying behaviour? Assessing the impact of situational factors. *Journal of Retailing and Consumer Services* 22: 145–157.

Bergkvist, L. & Zhou, K.Q. 2016. Celebrity endorsements: a literature review and research agenda. *International Journal of Advertising* 35(4): 642–663.

Chan, L.Q., Kong, Y.M., Ong, Z.Y., Toh, J.X., Von, Y.H., Lee, V.H., Loh, X.M. & Tan, G.W.H. 2022. Driving factors towards live-stream shopping in Malaysia. *Proceedings of International Conference on Emerging Technologies and Intelligent Systems ICETIS 2021* 1: 580–591.

Chan, T.K.H., Cheung, C.M.K. & Lee, Z.W.Y. 2017. The state of online impulse-buying research: a literature analysis. *Information and Management* 54(2): 204-217.

Chen, H., Zhang, S., Shao, B., Gao, W. & Xu, Y. 2021. How do interpersonal interaction factors affect buyers' purchase intention in live stream shopping? The mediating effects of swift guanxi. *Internet Research*, *ahead-of-p*(ahead-of-print).

Chuah, F., Memon, M.A., Ramayah, T., Cheah, J.H., Ting, H. & Cham, T.H. 2021. PLS-SEM using R: an introduction to cSEM and SEMinR. *Journal of Applied Structural Equation Modeling* 5(2): 1–35.

Cohen, J. 1988. Statistical power analysis for the behavioral sciences. In *Physical Review B - Condensed Matter and Materials Physics* (2nd ed., Vol. 60, Issue 6). Lawrence Etlbaum Associates.

eCommerce Market Malaysia - Data, Trends, Top Stores . (n.d.). Retrieved April 18, 2022, from https://ecommercedb.com/en/markets/my/all

Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M., Danks, N. & Ray, S. 2021. Partial least squares structural equation modeling (PLS-SEM) using R: A workbook. In *Springer*.

Hamilton, R. 2021. Scarcity and Coronavirus. *Journal of Public Policy and Marketing* 40(1): 99–100.

Hashmi, H.B.A., Shu, C. & Haider, S.W. 2020. Moderating effect of hedonism on store environment-impulse buying nexus. *International Journal of Retail and Distribution Management* 48(5): 465–483.

Heo, J., Kim, Y. & Yan, J. 2020. Sustainability of live video streamer's strategies: live streaming video platform and audience's social capital in South Korea. *Sustainability (Switzerland)* 12(5): 1–13.

Herzallah, D., Muñoz-Leiva, F. & Liebana-Cabanillas, F. 2022. Drivers of purchase intention in Instagram Commerce. *Spanish Journal of Marketing - ESIC* 26(2): 168–188.

Hew, J.J., Leong, L.Y., Tan, G.W.H., Lee, V.H. & Ooi, K.B. 2018. Mobile social tourism shopping: a dual-stage

analysis of a multi-mediation model. *Tourism Management* 66: 121-139.

Hsu, C.L. 2020. How vloggers embrace their viewers: focusing on the roles of para-social interactions and flow experience. *Telematics and Informatics* 49.

Huang, L.T. 2016. Flow and social capital theory in online impulse buying. *Journal of Business Research* 69(6).

Karim, M.W., Chowdhury, M.A.M., Masud, M.A.Al. & Arifuzzaman, M. 2021. Analysis of factors influencing impulse buying behavior towards e-tailing sites. *Contemporary Management Research* 17(2): 97–126.

Kock, N. 2015. Common method bias in PLS-SEM: a full collinearity assessment approach. *International Journal of E-Collaboration* 11(4): 1–10.

Krejcie, R.V. & Morgan, D.W. 1970. Determining sample size for research activities. *Educational and Psychological Measurement* 30(3): 607–610.

Lee, C.H. & Chen, C.W. 2021. Impulse buying behaviors in live streaming commerce based on the stimulus-organism-response framework. *Information (Switzerland)* 12(6): 1–17.

Leeraphong, A. & Sukrat, S. 2018. How facebook live urge SNS users to buy impulsively on C2C social commerce? *ACM International Conference Proceeding Series*.

Leong, L.Y., Jaafar, N.I. & Ainin, S. 2018. The effects of Facebook browsing and usage intensity on impulse purchase in f-commerce. *Computers in Human Behavior* 78: 160–173.

Li, C., Wang, Y., Lv, X. & Li, H. 2021. To buy or not to buy? The effect of time scarcity and travel experience on tourists' impulse buying. *Annals of Tourism Research* 86.

Li, M., Wang, Q. & Cao, Y. 2022. Understanding consumer online impulse buying in live streaming e-commerce : a stimulus-organism-response framework. *International Journal of Environment Reasearch and Public Health* 19(7).

Liu, Z. 2022. The impact of the legitimacy of livestream shopping on consumers ' willingness to buy. *Advances in Economics, Business and Management Research* 652: 432–440.

Livestream Shopping: The Future of E-commerce? 2021. Available at https://www.oppotus.com/livestream-shopping-the-future-of-e-commerce/

Lo, L.Y.S., Lin, S.W. & Hsu, L.Y. 2016. Motivation for online impulse buying: A two-factor theory perspective. *International Journal of Information Management* 36(5): 759-772.

Lou, C. & Yuan, S. 2019. Influencer marketing: how message value and credibility affect consumer trust of branded content on social media. *Journal of Interactive Advertising* 19(1): 58–73.

Luqman, A., Cao, X., Ali, A., Masood, A. & Yu, L. 2017. Empirical investigation of Facebook discontinues usage intentions based on SOR paradigm. *Computers in Human Behavior* 70: 544-555.

Ma, Y. 2021. To shop or not: understanding Chinese consumers' live-stream shopping intentions from the perspectives of uses and gratifications, perceived network size, perceptions of digital celebrities, and shopping orientations. *Telematics and Informatics* 59.

Ministry of Health Malaysia. 2021. China: market size of live commerce 2023. Available at https://www.statista.com/statistics/1127635/china-market-size-of-live-commerce/

Moore, J. 1996. On the relation between behaviorism and cognitive psychology. *The Journal of Mind and Behavior* 17(4): 345–367.

Sekaran, U. & Bougie, R. 2016. *Research Methods for Managers: A Skill-Building Approach*. New York: Wiley.

Song, H.G., Chung, N. & Koo, C. 2015. Impulsive buying behavior of restaurant products in social commerce: A role of serendipity and scarcity message. *Pacific Asia Conference on Information Systems, PACIS 2015 - Proceedings*.

Song, S., Yao, X. & Wen, N. 2021. What motivates Chinese consumers to avoid information about the COVID-19 pandemic? The perspective of the stimulus-organism-response model. *Information Processing and Management* 58(1): 102407.

Sun, Q., Rajamma, R.K., Heisley, D.D. & Soliman, M.A. 2022. Examining scarcity in mobile promotion and purchase intention: the role of location. *Journal of Marketing Theory and Practice* 30(1): 1–19.

Sun, Y., Shao, X., Li, X., Guo, Y. & Nie, K. 2019. How live streaming influences purchase intentions in social commerce: an IT affordance perspective. *Electronic Commerce Research and Applications* 37.

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

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

Xiang, L., Zheng, X., Lee, M.K.O. & Zhao, D. 2016. Exploring consumers' impulse buying behavior on social commerce platform: the role of parasocial interaction. *International Journal of Information Management* 36(3): 333–347.

Xu, X., Wu, J.H. & Li, Q. 2020. What drives consumer shopping behavior in live streaming commerce? *Journal of Electronic Commerce Research* 21(3): 144–167.

Zahari, N.H.M., Azmi, N.N.N., Kamar-BODIAN, W.N.I.W.A. & Othman, M.S. 2021. Impact of live streaming on social media on impulse buying. *Asian Journal of Behavioural Sciences* 3(1): 13–23.

Zhang, W., Leng, X. & Liu, S. 2020. Research on mobile impulse purchase intention in the perspective of system users during COVID-19. *Personal and Ubiquitous Computing* (2020).

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