From Interaction to Transaction: Analyzing the Influence of Social Presence on Impulsive Purchasing in Live Streaming Commerce

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Abstract

Objective: This study investigates how social presence elements, such as streamers, other viewers, and products, directly and indirectly influence consumers' impulse purchase behaviour in live-streaming commerce.

Design/Methods/Approach: An empirical evaluation was conducted on the suggested model, utilizing survey responses from 205 live-streaming commerce users. Furthermore, the interconnections among the elements within the research framework were examined through SEM PLS version 3.

Findings: The results show that social presence directly and significantly affects impulse purchase behaviour. This study also strongly links social presence with perceived usefulness and positive affect. In addition, the results show that perceived usefulness and positive affect significantly influence impulse purchase behaviour. Interestingly, perceived usefulness and positive affect serve as potential intermediaries linking the impact of social presence with impulse purchase behaviour.

Originality/Value: This research explores the influence of social presence and several consumer psychological factors, such as perceived usefulness and positive affect, on impulse purchase behaviour in live-streaming commerce. While this area has rarely been a significant focus in previous literature, the speciality of this research is integrating the product dimension into the social presence framework. This initiative has yet to be found in the literature so far. With this approach, the research seeks to provide an in-depth understanding of how social presence elements such as streamers, other viewers, and products collaborate and directly and indirectly impact impulse buying behaviour.

Practical/Policy implication: The results of this study offer a significant perspective for businesses in the e-commerce sector and individuals producing content for live-streaming commerce. This information can be used to create better approaches to encourage impulse buying behaviour and increase customer interaction. The interaction between social presence, perceived usefulness, and positive affect can be the basis for designing more efficient strategies.

Keywords: Live-streaming commerce, Social presence, Impulsive purchase behaviour, Perceived usefulness, Positive affect, Stimulus-Organism-Response (SOR)

JEL Classification: M3, M31

1. Introduction

The rapid progress of technology and the extensive expansion of digital platforms have caused a fundamental shift in how the business operates today. One of the most notable developments in this landscape is the emergence of live-streaming platforms as novel avenues for promoting and selling products (Liu et al., 2022). In contrast to conventional marketing methods that depend on fixed visuals and written explanations, live streaming brings forth an engaging aspect that transforms the way brand-consumer engagements occur. This trend has garnered notable attention in recent times, especially in the context of the Indonesian market. The surge is in part related to the effects of the COVID-19 pandemic, which has hastened the acceptance of online shopping platforms (Addo et al., 2021; Yin et al., 2023).

In live-streaming commerce, the dynamic and captivating nature of live video streaming can captivate viewers in a way that conventional marketing channels struggle to achieve (Rietveld et al., 2020). Like a two-way dialogue, live streaming enables immediate engagement between those broadcasting and those watching, enabling viewers to observe and partake in firsthand product usage and demonstrations (Chen et al., 2023). This degree of interactivity nurtures a feeling of involvement and interaction, metamorphosing viewers from passive information recipients into active contributors within the shopping journey (Alghamdi, 2023).

Innovative live-streaming shopping models transcend the limitations of traditional product descriptions, images, and reviews by providing consumers with in-depth insights (Hua et al., 2023). These models offer diverse perspectives from streamers and fellow consumers (Jai et al., 2021; Li et al., 2021). In addition, consumers can easily access the purchase links shared by the streamer during the live broadcast, thus promoting a seamless shopping experience (Chen et al., 2017; Liu et al., 2021). As a result, this dynamic approach increases consumer engagement, enriches their product experience, and builds the foundation for ongoing interactions that significantly influence purchase decisions (Kang et al., 2021).

Live streaming capabilities have encouraged Indonesia's largest e-commerce platforms, such as Shopee, Lazada, and Tokopedia, to integrate live trading into their platforms. Moreover, social media platforms have followed this trend by introducing live streaming-based commerce features (Merritt & Zhao, 2022). According to data collected by Statista, the total revenue from the e-commerce sector surged from $9.01 billion in 2017 to $55.97 billion in 2021. Projections also indicate that income from e-commerce platforms will continue to grow, estimated to reach $104.1 billion in 2027 (Statista, 2023a). The primary factors influencing revenue growth in the e-commerce sector are the introduction of the novel feature known as "live streaming commerce" across various e-commerce platforms and the impact of the COVID-19 pandemic (Burhan, 2021). Considering the rapid growth in the live-streaming commerce model, in-depth academic research on this phenomenon becomes highly relevant.

In recent years, the live-streaming industry has attracted the attention of academics with various studies exploring streamer and viewer motivations, including aspects such as utilitarian and hedonic motives (Hao & Huang, 2023), ease of use (Xu et al., 2022), and enjoyment factors (Yin et al., 2023). Moreover, research has closely examined specific features of live-streaming commerce, like the user interface design (Shin et al., 2023) and the gifting mechanisms (Lu et al., 2022). However, one crucial element that still requires further attention is the "social presence" in live-streaming commerce (Chen et al., 2023). This social presence has been recognized as key to delving into consumer engagement and supporting a deeper understanding of the desired services or products (Ye et al., 2020). Furthermore, an enhanced social presence has also been linked to impulsive buying tendencies, often encountered in live-streaming commerce (Hazrini et al., 2021; Huo et al., 2023). Highlighting the existing gap, our research takes a step further by integrating product dimensions, which, to date, have been limitedly used in studies of social presence (Zhang, 2023). We focus on evaluating the impact of various forms of presence, including the presence of the audience, streamers, and product presence, in driving impulsive purchases in Indonesia. By delving deeper into this aspect, we aim to fill the existing knowledge gap and further understand how these various presence elements can work together to influence consumer behaviour in live-streaming commerce.

We utilized the established Stimulus-Organism-Response (SOR) framework from behavioural science (Zhang et al., 2021) to support our research approach. The SOR concept explains that stimuli, in this case, social presence in various forms, influence an organism's response (Li et al., 2022). Meanwhile, perceived usefulness and positive affects mediate this response (Bigne et al., 2020). This Stimulus-Organism-Response (SOR) model corresponds to the patterns seen in live-streaming commerce dynamics, where cues (social presence) influence how consumers assess products and trigger spontaneous buying actions. We anticipate that our study will yield a fresh understanding of how 'social presence' impacts impulsive buying tendencies among consumers engaging in live-streaming commerce within the Indonesian setting. These discoveries hold significance as they can serve as a resource for crafting enhanced marketing strategies within a fast-paced and competitive business environment. The uniqueness of this study lies in its method of examining the direct and indirect effects of social presence on impulse buying behaviour, specifically in live-streaming commerce in Indonesia.

This research enriches the literature on the influence of "social presence" on "impulsive buying" within the landscape of "live streaming commerce" with three key contributions. First, we introduce a new perspective by incorporating the product dimension into the analysis of social presence. This multidimensional approach not only explores the interactions between the audience and streamers but also emphasizes the central role of the product's

presence itself. This element needs more attention in previous research, offering a more comprehensive insight. Second, we foster a deeper understanding of the influence of various aspects of social presence—including the audience, streamers, and products—on impulsive buying behaviour. By exploring the direct and indirect effects of social presence, this research has the potential to inform and enhance marketing strategies, adapting to the nuances of consumer behaviour in the continuously evolving digital era. Third, this research marks the innovative use of the Stimulus-Organism-Response (SOR) framework to unravel the complex dynamics behind impulsive buying in "live streaming commerce." The strategic application of the SOR framework enables this study to dissect the interrelations between social presence and impulsive buying behaviour with a more solid theoretical foundation, paving the way for a more integrated understanding of this phenomenon.

The remainder of this article is organized as follows: First, a review of relevant concepts is presented, followed by an introduction to the research model and related hypotheses. After that, a detailed description of the research methodology, data analysis, and research results is presented. Next, the research findings are organized in light of theoretical and managerial perspectives, and their implications are discussed. Finally, the study's limitations are recognized, and potential directions for future research are outlined.

2. Literature Review and Hypotheses Development

2.1 Literature Review
2.1.1 Live Streaming Commerce
Live-streaming commerce represents a progression from conventional e-commerce by integrating immediate social interaction (Cai & Wohn, 2019). This shift occurs on platforms that enable live streaming, facilitating e-commerce actions and transactions. These platforms employ live streaming technology to construct a digital environment, enabling users to engage in real-time interactions, partake in entertainment, and carry out business deals. In this scenario, streamers deliver content in real-time, offering viewers an exclusive avenue for engagement (Xu et al., 2020). There are three primary types of models for live streaming commerce: (1) platforms for live streaming that include commercial features like TikTok, (2) e-commerce websites like Shopee that provide live streaming capabilities, and (3) social networks such as Facebook Live, which use live streaming to improve the sales procedure (Wongkitrungrueng & Assarut, 2018).

In the scenario of utilizing live streaming for product sales, streamers commonly showcase a range of items in real-time and encourage viewers to buy them (Hu et al., 2017; Wongkitrungrueng & Assarut, 2018). The element of interactivity plays an essential role in live-streaming commerce as it encourages active engagement from users during communication and transactions (Kang et al., 2021). In addition to providing real-time details about the product, live-streaming commerce facilitates direct communication and engagement between the streamer and the audience (Wongkitrungrueng & Assarut, 2018), which in turn helps to form an emotional connection between the participants (Li et al., 2021).

Therefore, live-streaming commerce has arisen as a marketing strategy wherein streamers utilize technological means like computers and smartphones to showcase products via live-streaming. These streamers also offer links to enable seamless transactions. This method allows consumers to purchase and build social connections with streamers in real time (Hilvert-bruce et al., 2018; Hu & Chaudhry, 2020). This dynamic cultivates a shopping ambience that employs diverse tactics to stimulate buying behaviour (Sun et al., 2019; Xu, Wu et al., 2020). The term "live-streaming commerce" in this study pertains to the way streamers promote or sell items on a specific live-streaming platform.

2.1.2 Stimuli-Organism-Response (SOR) Theory
The Stimulus-Organism-Response (S-O-R) model was introduced by Mehrabian and Russell (1974). This theoretical framework suggests that the interaction between individuals and the external environment is affected by multiple elements, leading to changes in their internal state. Consequently, these internal factors lead to distinct personal responses and behaviours (Tak & Gupta, 2021). In other words, these internal factors shape individuals' responses and specific actions. Therefore, this theory is commonly used to explain how consumers make decisions and understand its mechanisms (Parboteeah et al., 2009). The application of this theory is extensive, especially in deciphering impulsive purchase behaviour, affirming its strong relevance and utility in practice (Huo et al., 2023).
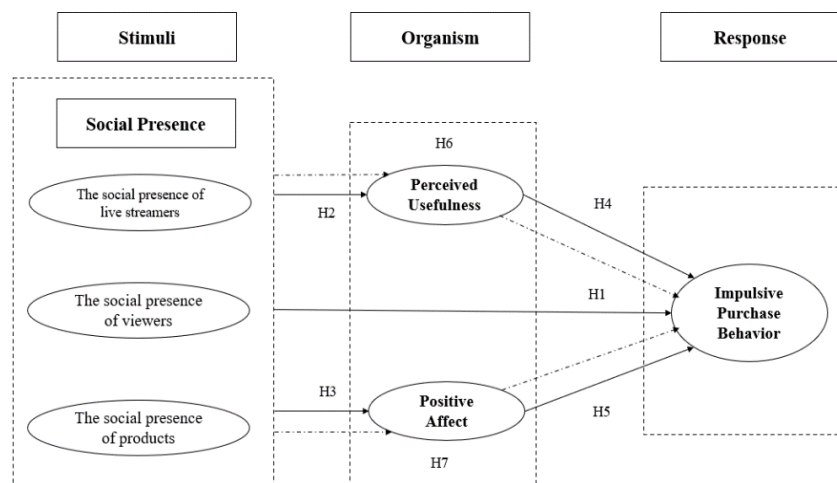
Figure 1. Conceptual research model

Eroglu et al. (2001) laid the foundation for the S-O-R theory in online shopping, aiming to explain the intricate ties between consumer actions in the digital sphere. Their study brought to light that alterations in the virtual store ambience (S) wield influence over various dimensions of consumers' internal conditions (O), thereby casting ripples on their shopping outcomes (R). In a parallel vein, Chopdar and Balakrishnan (2020) delved into the repercussions of distinct attributes of mobile commerce apps on the propensity for repetitive shopping and customer gratification. This particular inquiry honed in on impulsive purchasing conduct and the perception of value. In a similar investigative thread, Chan et al. (2017) conceptualized a framework that amalgamates cues from online shopping, consumer inner states, and impulsive consumer buying actions to untangle the interconnected weave among these three elements. This further lends credence to the efficacy of the S-O-R theory in encapsulating the essence of impulsive purchasing behaviour.

Furthermore, Zheng et al. (2019) discerned that the visual allure and convenience of online shopping catalyze impulsive purchase behaviour. The comprehensive and triumphant application of the S-O-R theory in dissecting impulsive purchasing conduct underscores its adaptability for examining such behaviour within the contours of live-streaming commerce. The current research adopts the framework of Chan et al. (2017), which considers explicit cues from online shopping, consumers' inner states, and impulse buying actions. These three aspects are highly relevant to the current research focus on impulse buying behaviour and the perceived value of social presence.

Prior investigations validate the significance of the S-O-R theory in comprehending how external stimuli elicit consumer responses and the associated mechanisms (Gao et al., 2022; Song et al., 2021; Wang et al., 2021). In live-streaming commerce, social presence holds paramount importance; however, it still needs to be explored in the current body of literature (Chen et al., 2023). As a result, this inquiry focuses on three fundamental components contributing to social presence stimuli: the social presence of the streamer, the social presence displayed by fellow viewers, and the social presence connected to the product. These combined elements constitute the external variables (S) within this study. Additionally, individuals' internal states (O) are reflected through their perceived usefulness and positive affect. Concurrently, this investigation delves into the response (R) manifested as impulsive purchasing behaviour among online consumers, aiming to decipher the underlying mechanisms. The research framework is visually represented in Figure 1.

2.2 Hypotheses Development

2.2.1 Impulsive purchase behaviour

Impulse purchases are actions triggered by a deep and sudden impulse without reflection or deep consideration (Piron, 1991). When individuals feel a deep urge to acquire a product or service, it manifests as impulse buying (Chan et al., 2017; Piron, 1991; Wells et al., 2011). Online shopping tends to trigger impulse buying behaviour more than conventional shopping (Wu et al., 2020). One reason for this is the illusion of a virtual transaction that makes consumers feel as if they are not spending money, as well as external stimuli in the online world, such as recommendations from previous buyers (Ming et al., 2021).

The emergence of live-streaming purchases, where broadcasters display product details in real-time, try the product for viewers, and interact directly with them, provides a new nuance to impulse buying (Xu et al., 2019). The interaction between broadcasters and their viewers and the detailed product presentation amplifies the potential for impulse buying (Wongkitrungrueng & Assarut, 2018). However, aspects of impulse buying in the context of live-streaming have yet to be widely explored in research. Some studies exist that try to understand the factors that influence such behaviour, but mainly from the perspective of consumers or sellers only (Leeraphong & Sukrat, 2018; Xu et al.,

2019). With that, this study aims to complement the literature by further exploring social presence in live-streaming commerce, incorporating the product dimension as a factor that may influence impulse buying.

2.2.2. Social presence

Social presence refers to how a person perceives the existence of others during interaction. The concept was initially applied in media-related communication and later evolved in research involving Information and Communication Technology (ICT) to explain the social dimension of the technology (Short et al., 1976; Tu, 2000). In recent years, many studies have delved deeper into social presence in virtual environments facilitated by ICT, including in communication, online business, social media transactions, and live-streaming business (Johnson & Hong, 2020; Lu et al., 2016; Ming et al., 2021; Song et al., 2019).

In the context of live streaming, social presence has three main dimensions: the social presence of the streamer, the social presence of the audience (Ming et al., 2021), and the social presence of the displayed product (Zhang, 2023). Streamers are essential in presenting products to the audience, and their unique qualities can influence purchasing decisions (Lu et al., 2016; Ming et al., 2021). In addition, live-streaming platforms offer a virtual environment where real-time interactions between streamers and audiences occur (Wongkitrungrueng & Assarut, 2018; Xu, Wu et al., 2020). The perceived social presence among viewers is related to how much they perceive the participation of other viewers, which is reinforced by features such as chat boxes (Li et al., 2022; Ming et al., 2021). Finally, the product's social presence relates to how the product is presented to consumers. Through live-streaming, consumers gain direct visual access to the product, allowing them to examine it from multiple perspectives (Vonkeman et al., 2017; Zhang et al., 2022).

Social presence in live-streaming commerce and impulsive purchase behaviour

In live-streaming commerce, the impulse to make impulse purchases may be shaped by the sense of connectedness encountered during live-streaming sessions. Participants often feel engaged with others in the online environment, an aspect called 'social presence' (Kojima et al., 2021), which generates a beneficial impact in the digital domain. The interactive engagement between streamers, viewers, and products in live-streaming commerce is a bridge that reduces the psychological gap between sellers and buyers that can encourage impulsive consumer behaviour (Long & Tefertiller, 2020; Rodríguez-Ardura & Meseguer-Artola, 2016). Nonetheless, few studies have investigated the direct impact of social presence in live-streaming commerce on impulse buying behaviour, leaving a void in the existing literature. This study seeks to address the research gap by examining the direct influence of social presence on impulse buying behaviour by offering the following hypotheses:

Hypothesis 1: Heightened social presence correlates with increased impulsive purchase behaviour in live-streaming commerce.

2.2.3. Social presence in live streaming commerce, perceived usefulness, and positive affect

Live-streaming commerce transcends spatial and temporal boundaries, constructing a digital realm wherein hosts meticulously showcase products, engage with audiences instantaneously, and offer tailored experiences (Wongkitrungrueng & Assarut, 2018). This engenders a potent social presence, enabling spectators to perceive the streamers' sentiments during live transmissions and unwittingly emulate their emotional manifestations (Hatfield et al., 1994; Pugh & Pugh, 2001). When engaged in live streaming commerce, viewers' understanding of the streamers' language, expressions, and behaviours creates two levels of psychological changes in their behaviour (Monroe et al., 2021), ultimately triggering positive emotional experiences and evoking pleasant feelings (Chen & Li, 2023). In a study by Guo et al., audience participation in mobile live streaming was associated with customer commerce behaviour, with the presence of streamers on the screen, primarily through their facial expressions and hand movements, influencing this behaviour (Guo et al., 2019).

Furthermore, research by Hancock and colleagues has revealed that viewers can detect and understand emotions expressed by fellow viewers in text-based communication situations through computers (Hancock et al., 2008). Within live-streaming commerce, the relevance lies in the ability of viewers to capture and interpret emotions conveyed through text-based communication, primarily via the chat room feature (Li et al., 2022). Incorporating the chat room feature enhances social interaction and engagement, enabling viewers to interact with streamers and other viewers while participating in live-streaming commerce activities. Streamers can trigger similar emotions in other viewers by recognizing and responding to text within the chat room feature.

When consumers encounter situations where they cannot physically experience products during live-streaming commerce, they often require assistance to evaluate product quality (Vonkeman et al., 2017). Live streaming commerce addresses this challenge by presenting product demonstrations that leverage senses and interactivity, allowing consumers to view products directly. This practice will enable consumers to inspect products from various angles and better understand the described products (Zhang et al., 2022). Through this interactive experience, uncertainties in purchasing can be reduced, and product information can be conveyed in real-time, enhancing perceived usefulness. Based on these findings, the following hypotheses are proposed:

Hypothesis 2: Increased social presence correlates with increased perceived usefulness in live-streaming commerce

Hypothesis 3: Increased social presence correlates with increased positive affect in live-streaming commerce

2.2.4. Perceived usefulness, positive affect, and online impulse purchases

Based on the uncertainty reduction theory, establishing connections happens when the capacity exists to predict the behaviours of individuals, leading to a decrease in vagueness (Lee & Choi, 2017). For example, social uncertainty arises when customers cannot see the product in person, as in live-streaming commerce (Kim et al., 2019). Uncertainty and potential risk in online shopping can inhibit consumers' propensity to purchase (Shaizatulaqma et al., 2018). However, a product demonstration approach that relies on sensory perception and interactivity could reverse this situation. Consumers can observe products from various angles and better understand the products described (Zhang et al., 2022). Through such interactive experiences, uncertainty in the purchasing process can be mitigated. Product information is conveyed in real-time, increasing the likelihood of impulsive purchase behaviour. Thus, the benefits consumers perceive directly impact impulsive buying and serve as a link between social presence and impulsive buying. Based on these findings, the following hypothesis is proposed:

Hypothesis 4: Increased perceived usefulness correlates with increased impulse purchase behaviour in live-streaming commerce

Hypothesis 5: Consumer-perceived usefulness can mediate the relationship between social presence and impulse purchase behaviour

The constructive outcomes of engaging with streamers and fellow viewers can also strengthen viewers' emotional engagement. High levels of emotional engagement have the potential to foster a stronger sense of attachment to the offering. This connection, in turn, can trigger an increased propensity to make spontaneous purchases (Vihari et al., 2022). Therefore, there is substantial evidence supporting the idea that positive emotions play a role in mediating the relationship between social presence and impulse buying behaviour. Several studies have emphasized the significant influence of positive affect on impulse buying behaviour (Bessouh & Belkhir, 2018; Setiawan & Ardani, 2022). Shoppers who experience positive affect during their shopping experience tend to be more prone to impulse purchases (Setiawan & Ardani, 2022). When positively influenced, this phenomenon arises from an increased urge to make unplanned purchases. However, different findings were presented by Prihatiningrum et al. (2019), who concluded that positive affect does not significantly influence impulse buying behaviour in local souvenir shops in Banjarmasin, Indonesia. Given the inconsistency of previous research results, this study aims to further validate the impact of positive emotions on impulse buying behaviour in the live-streaming commerce domain by proposing the following hypotheses:

Hypothesis 6: The higher the positive affect of consumers, the higher the impulse purchase behaviour in live-streaming commerce

Hypothesis 7: Consumer positive affect can mediate the relationship between social presence and impulse purchase behaviour

3. Method

3.1. Subjects

This study investigates how different components of live-streaming commerce influence the impulse purchase behaviour of engaged users. Data was obtained through an internet-based questionnaire distributed between August 14 and August 25, 2023, using Google Forms. Respondents were randomly selected from a pool of active participants living in Indonesia in the live-streaming commerce sector. The sample determination technique uses the Hair Formula. (Hair et al., 2017) suggests that the sample size determination is 5-10 times the number of indicators in the study. The number of indicators in this study was 22, so the lowest sample size was 110, and the highest was 220. In this study, the number of samples used was 220 samples. The Google Form link was widely distributed through WhatsApp instant messages, gathering 205 valid questionnaires out of 220 live-streaming commerce users. A validity rate of 93.18% depicts a strong response from the user community toward this survey.

The rapid advancement of internet connectivity in the Indonesian context has opened up new prospects in digital commerce (Degenhard, 2023). The trend of live-streaming commerce primarily reflects real-time direct interaction between sellers and consumers, fostering consumer interest in engaging in online purchases and responding to products (Lo et al., 2022). Indonesia has witnessed impressive growth as one of the largest e-commerce markets globally (Statista, 2023b). The revenue of the e-commerce sector in this country has surged significantly from $9.01 billion in 2017 to $55.97 billion in 2021 (Statista, 2023a). This growth is aligned with introducing innovative features in the e-commerce ecosystem, mainly through "live streaming commerce," where sellers can interactively showcase products to consumers (Burhan, 2021). One key element of live-streaming commerce is its ability to build a social bond between the seller, product, and consumer (Vonkeman et al., 2017). This interaction enriches consumer perceptions of the products and forms the basis for ongoing interactions, impacting impulsive purchasing decisions (Zhang & Shi, 2022). Therefore, this

research analyzes the presence of elements such as audience, streamer, and product display in influencing patterns of impulsive purchase behaviour.

3.2. Measurement

The study draws upon prior research theories concerning social presence, perceived usefulness, positive affect, and impulsive purchase behaviour. Table 1 presents the measurement tools corresponding to each variable employed in this study. Participants' responses are collected on a 5-point Likert scale, where five corresponds to "strongly agree," and one represents "strongly disagree," to ascertain the content validity of each assessment question.

Table 1. Research instrument

Variable	Code	Items	Source
Impulsive Purchase Behaviour	IPB	1. When watching live online, purchases are often made unintentionally. 2. While watching online commerce live streams, viewers sometimes come across items they may want to purchase, even if it was planned. 3. Sometimes, buying impulses arise when the streamer explains the favoured product in the live shopping event. 4. Finally, spending more money than previously planned occurs.	Cavazos-Arroyo & Máynez-Guaderrama (2022)
Social Presence	SP	**SPST** 1. Viewers understand the streamer's attitude during interactions during Live Streaming. 2. A sense of closeness is felt when communicating with the Streamer during Live Streaming. 3. Interaction with streamers feels familiar during live streaming commerce.	Ming et al. (2021)
		SPV 1. Viewers can understand that other viewers are interested in the product during live-stream commerce. 2. Viewers understood that other viewers shared product information during the live-stream commerce. 3. Viewers Are aware that other viewers have made product purchases during live-stream commerce.	Li et al. (2022)
		SPP 1. Viewers can envision the benefits of the products showcased in the live-streaming commerce. 2. Viewers feel like using the product showcased during the live-streaming commerce. 3. Viewers Gain insight into the use of the products showcased during the live-streaming commerce.	Zhang et al. (2022)
Perceived Usefulness	PU	1. Live streaming helps save viewers' shopping time to find and buy products. 2. Live streaming commerce helps viewers find what they want online. 3. Live streaming increases viewer productivity in finding and buying products. 4. Live streaming commerce allows viewers to search and purchase products more effectively than other online methods. 5. Live streaming improves audience shopping efficiency.	Lee & Chen (2021)
Positive Affect	PA	1. Viewers feel enthusiastic during live-streaming commerce. 2. Viewers feel excited during live-stream commerce. 3. Viewers feel motivated to shop during live-streaming commerce. 4. Viewers feel happy to make purchases during live-streaming commerce	Xu et al. (2020)

4. Result and Discussion

4.1. Respondent Characteristics

Table 2 summarizes the characteristics of the respondents in this study. The tabular data succinctly captures these aspects, illustrating the distribution and proportion of the sample regarding variables such as gender, age, education level, income, and most preferred live streaming platform. Based on the tabulated information, it can be seen that most respondents are female (63%), fall in the age range of 17 to 28 years old (80%), and most have a college degree (43%). The majority indicated an income below 1,500,000 (56%). Significantly, the live-streaming platform TikTok emerged as the top choice for live-streaming commerce, favoured by 62% of the participants.

Table 2. Respondent characteristics

Category	Subcategory	Frequency	%	Cumulative per cent
Gender	Female	129	63%	63%
	Male	76	37%	100%
Age	17-28	163	80%	80%
	29-46	39	19%	98%
	47-58	1	1%	99%
	>58	2	1%	100%
Education Level	<High School and High School	65	32%	32%
	Diploma I/II/III/IV	34	17%	49%
	Bachelor's Degree	89	43%	92%
	Master's/Doctoral Degree	17	8%	100%
Income Level	<1.500.000	115	56%	56%
	1.500.000-2.500.000	24	12%	68%
	2.500.000-3.500.000	44	21%	89%
	>3.500.000	22	11%	100%
Frequently used live-streaming commerce platforms.	TikTok Live	128	62%	62%
	Facebook Live	22	11%	73%
	Marketplace Live (Tokopedia, Shopee, Lazada, Zalora)	30	15%	88%
	Instagram Live	25	12%	100%
Domicile	Sulawesi	83	41%	41%
	Kalimantan	5	2%	43%
	Nusa Tenggara	5	2%	45%
	Java	22	11%	56%
	Jabodetabek	2	1%	57%
	Bangka Belitung	69	34%	91%
	Maluku	3	1%	92%
	Papua	1	1%	93%
	Sumatera	15	7%	100%

4.2. Measurement Model

The measurement structure, called the Outer model or indicator examination, yields outcomes about the model's soundness and authenticity. These results are evaluated using benchmarks like discriminant validity, composite reliability, and convergent validity, as expounded below.

Convergence Validity

Assessing convergent validity involves analyzing the correlation between scores of indicators and the associated construct. The validity of convergent indicators is acknowledged when their correlation values exceed 0.50. If any indicators fail to meet this standard, they should be removed. Strong indicators are identified by loading factor values surpassing 0.70, while those above 0.60 are considered acceptable (Hair, 2017). This investigation explicitly asserts that a loading factor value of at least 0.60 is required; indicators below this benchmark must be excluded. By utilizing outer loading in Table 3 for convergence testing, all elements exhibit values that fulfil the criteria for convergent validity, surpassing 0.60. Consequently, it can be deduced that the construct holds validity.

Table 3. Convergent validity (outer loading) test result

	Impulsive Purchase Behaviour	Positive Affect	Perceived Usefulness	Social Presence
IB1	.86			
IB2	.903			
IB3	.9			
IB4	.82			
PA1		.904		
PA2		.923		
PA3		.891		
PA4		.867		
PU1			.837	
PU2			.881	
PU3			.902	
PU4			.871	
PU5			.856	
SPP1				.815
SPP2				.816
SPP3				.817
SPST1				.823
SPST2				.775
SPST3				.813
SPV1				.776
SPV2				.81
SPV3				.778

Composite Reliability and Discriminant Validity

Indicators of variables are utilized to demonstrate the depth within the constructed variables, and the assessment is conducted through composite reliability. The reliability of a construct is considered satisfactory if its composite reliability value exceeds 0.70 (Hair *et al.*, 2017), as reflected in Table 4. This table indicates that all constructs possess composite reliabilities above 0.70, signifying high consistency and stability in using the instrument. In other words, it can be inferred that the employed instrument has met the reliability criteria.

In the meantime, assessing discriminant validity involves gauging how distinctly a particular construct stands apart from others, as substantiated by empirical criteria. One method entails calculating the Average Variance Extracted (AVE), with a recommended threshold exceeding 0.50 (Hair *et al.*, 2017). As illustrated in Table 4, it is evident that all the indicators confirm their validity, as the AVE values for each variable exceed the specified 0.50 threshold.

Table 4. Composite reliability and discriminant validity

Construct	Criteria	Cronbach's Alpha	Composite Reliability	Criteria	AVE
IB		.894	.926		.759
PA	>0.70	.919	.942	>0.50	.803
PU		.919	.939		.756
SP		.931	.942		.644

4.3 Evaluation of Model's Goodness and Fit

Partial Least Squares (PLS) represent a variance-focused method in Structural Equation Modeling (SEM) designed explicitly for examining theoretical frameworks in predictive research. As a result, researchers have devised various measures for appraising the validation of the proposed model (Luthfiana et al., 2023). These indicators include R square, Q square, Standardized Root Mean Residual (SRMR), PLS prediction (Hair et al., 2019), and the Goodness of Fit Index (GoF Index) (Henseler & Sarstedt, 2013). Here, we present an overview of these measures and the associated criterion results:

The qualitative interpretation of R-squared values, as described by Hair et al. (2011), indicates varying levels of impact: 0.25 (minimal impact), 0.50 (moderate impact), and 0.75 (significant impact). Based on the R Square test results, social presence has a moderate effect on impulse buying behaviour, with a value of 0.621. Likewise, social presence moderately affects perceived usefulness, with a value of 0.595. However, social presence has a low influence on positive affect, with a value of 0.426.

Likewise, the qualitative explanation of Q-squared, according to Hair et al. (2019), denotes different degrees of influence: 0 (minimal influence), 0.25 (moderate influence), and 0.50 (considerable influence. The results show that the Q square value for the impulse buying behaviour variable related to social presence is 0.463. Meanwhile, the effect of social presence on perceived usefulness and positive influence is measured at 0.443 and 0.336, respectively. All of these obtained values are more significant than 0.25, which leads to the conclusion that this study has a moderate level of predictive accuracy.

An SRMR value less than 0.10 is considered an appropriate indicator of suitability (Henseler et al., 2014). This value serves as a measure of fit in PLS-SEM, which helps prevent specification errors in the model. The model estimation yielded a value of 0.068, indicating an acceptable model fit level. The empirical data collected in this study clarifies the influence between variables in the model.

Referring to research conducted by Ghozali & Latan (2015), the interpretation of the GoF value can be summarized as follows: a value of 0.1 corresponds to a low level of fit, 0.25 indicates a moderate level of fit, and 0.36 indicates a high level of fit. The results show a GoF Index value of 0.574, underscoring the effective representation of empirical data in this study and the establishment of a measurement model with a strong level of fit.

The application of Partial Least Squares (PLS) for predictive purposes stands as a validation of the effectiveness of the PLS predictive test, underscoring that PLS results provide a more robust measure of predictive capability. Therefore, comparing the basic linear regression (LM) model is essential. One way to evaluate the predictive performance of a Partial Least Squares (PLS) model is to compare the Root Mean Squared Error (RMSE) or the Mean Absolute Error (MAE) it produces with those of a linear regression model, aiming to determine if the PLS model exhibits lower error values (Hair et al., 2019). Two scenarios warrant consideration: (a) If all measurement components within the PLS model yield RMSE and MAE values lower than those of the linear regression model, then the PLS model demonstrates a robust predictive capacity. (b) If some components yield lower values, the model demonstrates moderate predictive power. Based on the PLS prediction test results shown in Table 5, it can be seen that many measurement components in the PLS model result in lower RMSE and MAE values compared to the linear regression (LM) model. This finding implies that the proposed PLS model shows moderate predictive capacity.

Table 5. PLS predict the test result

Construc	PLS		LM	
	RMSE	MAE	RMSE	MAE
IPB-1	1.067	.793	1.102	.808
IPB-2	.856	.633	.883	.625
IPB-3	.915	.692	.941	.701
IPB-4	1.009	.778	1.045	.8
PA-1	.869	.646	.846	.598
PA-2	.957	.729	.949	.727
PA-3	.982	.757	.941	.728
PA-4	.914	.703	.897	.685
PU-1	.88	.636	.902	.658
PU-2	.806	.593	.842	.617
PU-3	.819	.593	.832	.613
PU-4	.809	.577	.814	.569
PU-5	.841	.621	.801	.574

4.4 Results of Hypothesis Testing

This section elaborates on the interactions between constructs and provides insights into the correlations among variables. The values presented in Table 6 were obtained using a bootstrapping approach with 5000 resampling iterations, following the recommendation (Hair et al., 2017). The threshold value for the t-statistic in this study, utilizing a one-tailed measurement approach, is set at 1.65, with a significance level of 5% (Malhotra et al., 2017). The results of the hypothesis tests indicate that all hypotheses are substantiated.
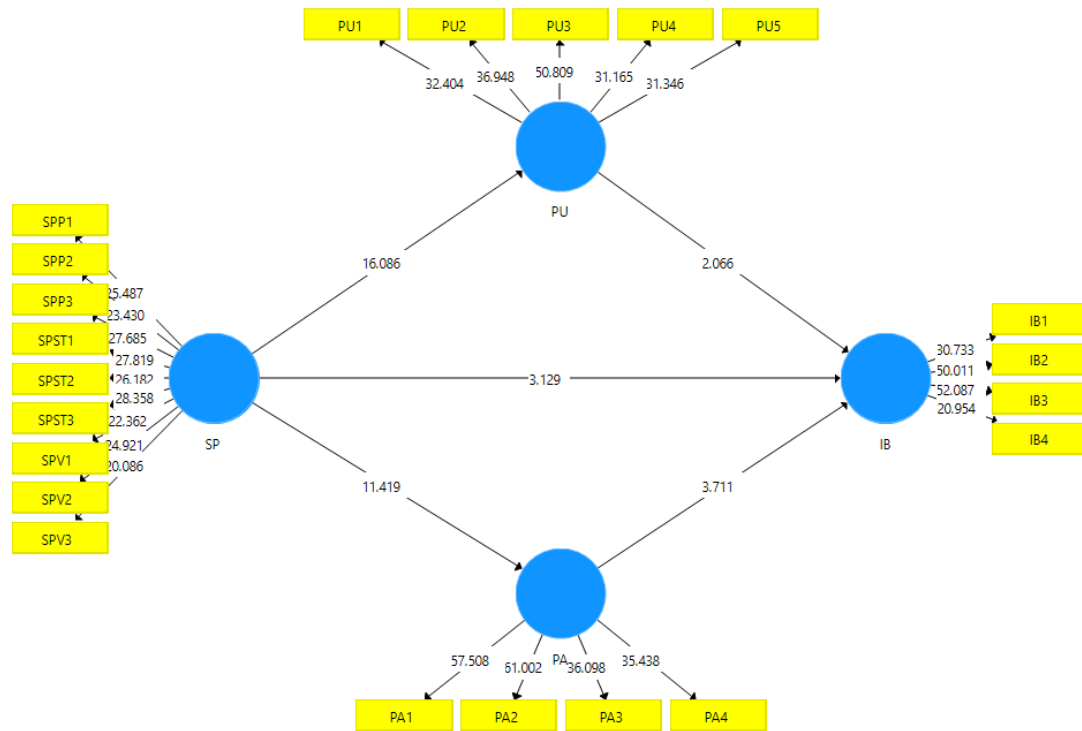
Figure 2. Model results

Table 6. Hypothesis testing results

Construct		Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Conclusion
H1	SP -> IB	0.327	0.105	3.129	0.002	Accepted
H2	SP -> PU	0.771	0.048	16.086	0.000	Accepted
H3	SP -> PA	0.653	0.057	11.419	0.000	Accepted
H4	PU -> IB	0.243	0.118	2.066	0.039	Accepted
H5	PA -> IB	0.312	0.084	3.711	0.000	Accepted

Mediation test results

To measure the significance of the mediator variable in the mediation analysis, we used the Sobel Test. The evaluation tool we used is available on Daniel Soper's website (Soper, n.d.). Statistical significance is determined based on a critical z-value exceeding 1.96 (Yay, 2017) and a p-value less than 0.05 (Dastgeer et al., 2020). The results show that "perceived usefulness" has a Z-value of 2.043 and a P-value of 0.02. Meanwhile, "positive affect" has a Z-value of 3.533 and a P-value of 0.000. Both of these variables are following the predetermined threshold. This shows that perceived usefulness and positive affect play a significant role as mediators between social presence and impulse buying behaviour. However, this finding confirms that positive affect is more dominant than perceived usefulness in explaining how social presence affects impulse buying behaviour. Thus, positive affect is more influential than perceived usefulness in influencing the impact of social presence on impulse buying behaviour.

4.5 Discussion

This study explores the impact of social presence cues (S), perceived usefulness, and positive affects (O) on spontaneous purchasing behaviour (R) within the context of live-streaming commerce. The following section will concisely overview the fundamental discoveries and their practical implications.

The Influence of Social Presence on Impulse Purchase Behaviour

Our study reveals the significant impact of social presence on impulse purchase behaviour in live-streaming commerce. Various factors, such as dynamic interaction from streamers, virtual friendships with fellow viewers, and clear visibility of highlighted products during live-streaming sessions, have an essential influence on the decisions taken by viewers when making purchases. The findings are consistent with the research conducted by Zhang & Shi (2022) and

Liu (2023), highlighting that the primary social presence factors directly influence impulse buying behaviour. Similarly, the study by Lee & Chen (2021) demonstrates that viewers are often driven to make impulse purchases during live-streaming commerce, drawn by the allure of captivating product displays and their interactive engagement with streamers. At the core of the streamer's influence is the establishment of an emotional connection with the audience. This connection is fostered through direct interactions and facial expressions, nurturing a sense of trust and closeness. These emotions, in turn, give rise to inclinations for impulsive purchasing. This emotional bond motivates viewers to heed the streamer's recommendations, primarily when the streamer responds to viewer comments or provides additional insights about the products. Such instances contribute to the perception that viewers are valued and possess a deeper understanding of the featured merchandise. Furthermore, the presence of fellow viewers also assumes a pivotal role in impulsive buying, particularly when they witness the purchases made by others or offer positive feedback. This phenomenon suggests that products that garner appreciation through social interactions become even more appealing.

The Effect of Social Presence on Perceived Usefulness and Positive Affect

Our research findings suggest that social presence plays a role in enhancing perceived usefulness and positively affecting consumer experiences during live-streaming commerce. Interactions with streamers and other viewers provide an additional dimension to viewers' perceived usefulness of a product or service. In purchasing products that cannot be physically touched during live streaming (Vonkeman et al., 2017), real-time interactions and detailed information delivery reduce uncertainty and increase perceived usefulness (Zhang et al., 2022). Positive affect derived from social interaction and a sense of community foster an environment conducive to impulse buying. Feelings of happiness, enthusiasm, and connection with streamers and other viewers motivate shoppers to make impulsive decisions. These findings support previous research that found a positive relationship between social presence with perceived usefulness (Zhu et al., 2023) and positive affect (Chen et al., 2023; You et al., 2023).

The Effect of Perceived Usefulness and Positive Affect on Impulse Purchase Behaviour

Our findings suggest that perceived usefulness and positive affect also play a role in influencing impulse purchase behaviour. The benefits consumers perceive, such as in-depth product explanations and direct interaction with sellers, become a motivation to participate in live streaming and actively drive impulse buying behaviour. The findings of this study align with those of Ika et al. (2023), which highlighted the direct influence of perceived usefulness on impulse buying behaviour. Similarly, Gong and Jiang (2023) found that perceived product quality benefits can elicit emotional responses in consumers, prompting them to engage in impulse purchases. Positive emotions, particularly pleasure and connection with streamers and fellow viewers create an environment conducive to impulse buying. This observation resonates with Verhagen and Dolen (2011) insights, who emphasized the crucial role of positive emotions in igniting impulse buying tendencies, especially in e-commerce contexts. Further corroborating this emphasis on emotions and perceived benefits, Zuo and Xiao (2021) observed that these elements significantly shape consumer impulse buying behaviour.

The Mediating Role of Perceived Usefulness and Positive Affect on the Relationship of Social Presence and Impulse Purchase Behaviour

Our research findings indicate that the interplay between perceived usefulness and positive emotions mediates social presence with impulsive purchase behaviour in live-streaming commerce. The positive impact of social presence contributes to an elevation in perceived usefulness and positive emotions. Perceived usefulness triggers buyer curiosity, fosters active engagement, and stimulates the potential for impulsive transactions. Positive emotions create an atmosphere that encourages tendencies for impulsive purchasing. This research's findings are consistent with those presented by Zuo and Xiao (2021), which shows that streamer charisma and feelings of social connectedness can influence consumers' impulse purchase tendencies by influencing perceived usefulness and enjoyment. Furthermore, this study shows that social presence more substantially impacts impulse buying behaviour through positive affect than perceived usefulness. Affective factors influence viewers' impulse purchase decisions more than their rational product quality evaluation.

The findings of this study carry substantial implications for the realm of marketing and business tactics. Businesses engaged in live-streaming commerce should create experiences that evoke positive emotions, encouraging impulse buying behaviour. To achieve this goal, businesses may need strategies that activate positive emotional responses and foster emotional bonds between streamers, viewers, and merchandise. Marketing approaches should be comprehensively designed to create an upbeat and captivating atmosphere during live broadcasts. Content that is inspiring, entertaining, and encouraging friendly interaction can foster a supportive atmosphere. In addition, gaining a deeper understanding of the audience and customizing product presentations to evoke affirmative sentiments is also very important. In the field of product development, companies have the opportunity to create products that trigger favourable emotional reactions in their target audience. Elements such as appealing design, compelling product narrative, and thoughtful product presentation are essential in enhancing the rational evaluation of potential consumers.

5. Conclusion

This research studies the impact of social presence, perceived usefulness, and positive affect on impulse purchase behaviour in live-streaming commerce. The findings highlight the profound effects of social presence, primarily driven by streamers' virtual presence, viewer engagement, and product presentation, in shaping purchase decisions. Such presence builds emotional bonds, fostering trust and closeness, leading to impulse purchases. This research further proves that social interaction increases perceived product benefits and evokes positive emotions, which play an essential role in impulse buying. An essential insight is the significant mediating role of perceived usefulness and positive affect in the relationship between social presence and impulse buying. Specifically, this study concludes that positive affect, stemming from excitement and connection, has a more substantial influence on impulse purchase decisions than rational product quality evaluations.

In addition, our research highlights the impact of social presence on impulse purchases, which is critical for businesses. This research provides important implications for businesses looking to increase their potential in live-streaming commerce. The findings emphasize that building an emotional connection between streamers and viewers is crucial for a successful live-streaming commerce strategy. Therefore, businesses should invest in comprehensive training for their streamers. A skilled and knowledgeable streamer can effectively explain products, answer audience questions, and cultivate a deeper emotional connection with the audience. This training should also include content supervision during live broadcasts to maintain the brand image. The streamer's emotional connection with the audience can encourage impulse purchases. In addition, businesses need to understand the social dynamics at play. Viewers are influenced by purchases and positive feedback from their friends. Businesses can capitalize on this by increasing audience engagement and positive feedback through integration with other social media platforms such as Instagram, Facebook, or Twitter. Live streaming also allows for real-time product demonstrations, thus aiding viewers' understanding of the product. Therefore, businesses should prioritize in-depth product presentations while maintaining an upbeat and enthusiastic atmosphere. Finally, it is essential to balance detailed product information and a fun experience for the audience. By understanding and utilizing these dynamics, businesses can increase the commerce potential of their live streams.

While this research has important implications, it has specific limitations that provide valuable direction for future research efforts. First, live-streaming commerce can be divided into three different categories. (1) live streaming platforms that integrate commercial activities, such as TikTok; (2) e-commerce websites and marketplaces, such as Shopee, or mobile apps that include live streaming features; and (3) social networking sites (SNS) that incorporate live streaming features, such as Facebook Live, to facilitate sales (Wongkitrungrueng & Assarut, 2018). Current research comprehensively analyzes live-streaming commerce without differentiating or comparing different categories. Such an approach may need to be more transparent for each category's strategies, risks, and opportunities. As a result, it may result in generic strategies that may only effectively cater to some platforms. To offer more tailored recommendations and insights, future research should dissect these categories and study the unique attributes of each. This would be particularly helpful for businesses or individuals looking to capitalize on the potential of live-streaming commerce. Second, there is a clear distinction between the impulse to engage in impulse buying behaviour and the actual execution of an impulse purchase (Badgaiyan & Verma, 2015). The urge to buy only sometimes culminates in impulse buying behaviour, as other psychological determinants play a role in this transition (Iyer et al., 2020). However, this study refrained from investigating the nuanced differences between these two aspects separately. This understanding is crucial as it provides a more in-depth picture of consumer purchasing decisions. Moreover, for marketers, understanding the difference between desire to buy and impulse buying can help design more effective marketing strategies. Therefore, future research can study the mechanisms that drive impulse buying tendencies to convert them into actual purchase actions. Third, the model used in this study exclusively considers two intrinsic factors about users' psychological state: perceived usefulness and positive affect. For future research, it is recommended to comprehensively explore users' psychological state, which includes dimensions such as trust (Ming et al., 2021). Trust can affect consumers' perception of risk and uncertainty. In a live streaming environment, where products are displayed in real-time and interactions between buyers and sellers are dynamic, trust can be crucial in motivating impulse purchases (Ma et al., 2022). In addition, future research efforts can refine this model by incorporating other related variables, including marketing stimuli, to improve the understanding of consumer behaviour in live-streaming commerce (Chen & Yue, 2023).

Author Contribution

Andika: conceptualization, data curation, writing original draft, methodology, formal analysis, supervision
Tiara Nur Anisah: review and editing, validation, visualization
Mohamad Najmudin: writing review and editing, supervision
Anita Ekawati Sardi: visualization, validation.

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The authors affirm that no potential conflicts of interest are associated with the creation and dissemination of this research.

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