IT Affordances, Flow, and Perceived Scarcity:
A Study on Impulsive Buying Behavior and Post-Purchase Dissonance in Live Shopping

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Abstract - Live shopping has evolved significantly as extensive publications have explored this phenomenon from the perspective of streamers and consumers. However, there is limited analysis from the human-computer interaction perspective, particularly concerning IT affordances. Therefore, the research aimed to enhance the understanding of human-computer interaction in live streaming sessions, exploring flow experiences and the influence on impulsive buying behavior, which led to post-purchase dissonance. The moderating role of perceived scarcity was also examined. The research adopted convenience sampling and obtained 250 online survey responses. The data were analyzed using Partial Least Squares - Structural Equation Modeling (PLS-SEM) to test the hypotheses. The results show that three IT affordance components, visibility, metavoicing, and interactivity, foster flow experiences, but guidance shopping does not. Furthermore, flow experiences are found to stimulate impulsive buying behavior, which subsequently leads to post-purchase dissonance. The results further show a negative impact of perceived scarcity on buying behavior, while the effect of scarcity is anticipated to enhance buying motivation. These results contribute to understanding the significant drivers of flow experiences in live shopping and the implications of perceived scarcity. Enhancing interactive communication between streamers and viewers is essential for businesses while promoting attractive visibility and comprehensive product information during live shopping sessions. Additionally, scarcity effects should be approached with caution only when necessary to accelerate the call to action.

Keywords: IT affordances, flow, perceived scarcity, impulsive buying behavior, post-purchase dissonance, live shopping

I.   INTRODUCTION

Live streaming is a popular form of user-generated content (Hu et al., 2017), where streamers upload real-time video content on various topics such as games, talent shows, and daily life. Among these, live streaming or shopping has evolved as a significant innovation in the e-commerce industry (Chen et al., 2023). It occurs during live video streaming sessions on e-commerce platforms and rapidly gains popularity. According to a Statista report, the Gross Merchandise Value (GMV) of the Indonesian e-commerce market reached over $62 billion in 2023, with approximately $5 billion attributed to live shopping (Wolf, 2023). With nearly 234 million active Internet users, the Indonesian e-commerce market is expected to grow to around $120 billion by 2025 and $200 billion by 2028 (Uzunoglu, 2024). Due to the substantial commercial potential, conducting an in-depth study into live shopping is highly valuable.

Online shopping can be challenging due to the need for physical interaction with products. Consumers also experience a Zero Moment of Truth (ZMoT) when pursuing information about a product through online platforms such as search engines, product reviews, and advertisements. Therefore, difficulty in evaluating the product before buying can lead to dissatisfaction (Syah

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& Olivia, 2022). Live shopping further addresses this issue by allowing consumers to investigate products during live streaming sessions, facilitating interaction on both a one-to-many (streamer to viewer) and many-to-many (among viewers) basis (Fonseca & Barbosa, 2021). This method enhances the human-computer interface during consumers' ZMoT (Al-Ababneh, 2022).

From the human-computer interaction perspective, creating an effective web interface that facilitates communication between consumers and online sellers is crucial for a smooth ZMoT experience. Previous publications also show that social and technical aspects interact during streaming sessions (Min & Tan, 2022a). The relationship between social (users) and the technical aspects (IT features) is defined as IT affordances (Chatterjee et al., 2020), which are potential behaviors arising from the interaction between an object or actor with a specific purpose. In information systems, affordances refer to the possibility that an object can influence an individual to perform a particular activity. Furthermore, affordances relate to the potential buying actions enabled by the technical attributes of an e-commerce platform, enhancing user satisfaction (Shao et al., 2020) and developing platform stickiness. The study of user perceptions and technical aspects is also allowed by features such as guidance shopping, visibility, metavoicing, and interactivity.

Although extensive publications exist on IT affordances, the relationship with flow experiences is still underexplored. The relationship between flow experiences and impulsive buying behavior is also well-documented, but the role of perceived scarcity in affecting this impact requires further investigation. Previous publications have examined the formation of impulsive buying behavior with limited discussion on post-purchase dissonance. Therefore, further publication is necessary to understand how live shopping influences IT affordances, including visibility, metavoicing, guidance shopping, interactivity, flow experiences, perceived scarcity, impulsive buying behavior, and post-purchase dissonance.

The psychological model of Stimulus–Organism–Response (S-O-R) has been validated in a live-streaming context by identifying systems and services as stimuli that develop flow as the organism and recognize compulsive buying as the response (Min & Tan, 2022b). Additionally, the technical features of live-streaming e-commerce, which are influenced by the flow experiences, are essential variables affecting impulsive buying behavior and post-purchase dissonance (Gao & Bai, 2014; Liu et al., 2022).

Visibility also allows consumers to access product information when live shopping (Ciuchita et al., 2022), directly showing that product-related pictures and details help to reduce perceived uncertainty and risk. Sellers showcasing product pictures and relevant information simultaneously can enhance positive interactions between consumers and platforms (Dong & Wang, 2018; Sun et al., 2019). The previous research further identifies a relationship between visibility and flow experiences in online shopping. Sellers foster positive interactions and greater consumer engagement by simultaneously showcasing and introducing products, leading to an immersive shopping experience (Fengliang & Jianhong, 2021; Ma et al., 2022). The following hypothesis is proposed based on these results.

H1: Visibility positively influences flow experiences.

Metavoicing is an engagement in online interactions by responding to consumers' presence, profile, content, and activities (Zhou & Lou, 2024). Previous publications show that streamers deliver instant personalized services to consumers effectively through metavoicing, which aids in buying decisions (Lu et al., 2023; Alghamdi et al., 2023). Consumers can also ask advanced questions by responding to streamer comments and receive answers through the interactive process (Zhang et al., 2023). Metavoicing further motivates consumers to obtain helpful information about desired products (Tuncer, 2021). Metavoicing increases engagement in live shopping by enabling consumers to comment and interact with the streamer. This interaction further fosters flow experiences, where consumers feel immersed and engaged in shopping activity (Dong et al., 2016; Hu et al., 2017). The following hypothesis is proposed based on these results.

H2: Metavoicing positively influences flow experiences.

Shopping guidance offers products and services customized to the needs, interests, and demands of customers (Dong & Wang, 2018). Sellers can provide real-time shopping guidance by improving the buying quality and strengthening the interaction of consumers (Sun et al., 2019). Technical features such as personalized product recommendations also play a crucial role in aiding consumers' decisions (Saffanah et al., 2023). However, consumers feel comfortable using a live shopping platform when the streamer can effectively assist with personalized online shopping tasks, leading to the development of flow experiences (Fengliang & Jianhong, 2021; Tuncer, 2021). Consumers also feel more comfortable when guided by platform features adapted to individual needs. It allows consumers to focus more on shopping and increases the possibility of flow experiences (Dong et al., 2016; Zhang et al., 2023). Based on these discoveries, the following hypothesis is proposed.

H3: Guidance shopping positively influences flow experiences.

Interactivity, including two-way communication and synchronicity between sellers and consumers, further affects the shopping experience. It refers to the degree and depth of mutual communication between two parties (Ma et al., 2022). In live shopping,

interactivity increases consumers' engagement, strengthens vendor responsiveness to questions, and further improves the online shopping experience (Kang et al., 2021). Sellers are also enabled to improve responsiveness to consumers' inquiries and provide measured information in real-time (Xue et al., 2020; Zhang et al., 2023), allowing viewers to experience extensive sensory sensations without the time and place limits (Dong et al., 2022). Real-time interactions further develop intense interactions between streamers and consumers, allowing consumers to focus entirely on shopping activity (Liu et al., 2022). Based on these discoveries, the following hypothesis is proposed.

H4: Interactivity possesses a positive influence on flow experiences.

Flow experiences are psychological conditions where an individual fully engages in an activity with a high concentration (Csikszentmihalyi, 1990). It further occurs when a task is carried out with full attention. It happens when internal and external conditions are correlated, such as deep concentration, feeling controlled, feedback, and balancing task challenges and expertise (Kotler et al., 2022). In live shopping, flow experiences enable consumers to focus and fully engage in the activity, which further improves buying decisions (Fang et al., 2018). It reduces the differences of opinion between consumers and streamers, speeding up the buying process to result in impulsive buying (Lu et al., 2023).

Impulsive buying behavior can further be triggered by unexpected needs, visual signals, promotional campaigns, and reduced cognitive control (Rodrigues et al., 2021). This behavior only occurs when a sudden and intense emotional desire triggers reactive action with low cognitive control. Interactivity and emotional stimulation can also increase consumers' tendencies to make impulsive buying in live shopping (Li et al., 2022). Activities, such as exciting background music, attractive visuals, entertaining videos, and user-friendly interactive designs, make consumers feel comfortable and focused, prompting unplanned buying (Ming et al., 2021). The sense of total participation and augmented positive emotions increase the tendency to buy impulsively (Wu et al., 2020; Paraman et al., 2022). Based on these discoveries, the following hypothesis is proposed.

H5: Flow experiences have a positive influence on impulsive buying behavior.

Marketers in e-commerce often use scarcity promotions, where the availability of products or events is limited (Gong & Jiang, 2023). Companies may even attempt to develop a shortage by deliberately and artificially limiting supply or creating a perception of shortages through scarcity messages (Cengiz & Şenel, 2024). Perceived scarcity is defined in the research as the perception that a particular object is rare or limited (Baumgärtner et al., 2006), which also affects the value of the subject, making the products and services appear more valuable. A perception of a lack of resources, such as money or time, can force an individual to focus on urgent needs, increasing the intention to acquire the goods impulsively (Hao & Huang, 2023). In live shopping, perceived scarcity can intensify the activities and increase susceptibility to impulsive buying as consumers become more immersed in the experience. This statement suggests that perceived scarcity increases the impact of flow in driving impulsive buying behavior. Based on these discoveries, the following hypothesis is proposed.

H6: Perceived scarcity moderates the relationship between flow experiences and impulsive buying behavior.

Impulsive purchases often lead to feelings of discomfort, post-purchase dissatisfaction, or dissonance (Barta et al., 2023). Post-purchase dissonance is the psychological discomfort experienced after purchase, specifically when there is a discrepancy between expectations and reality. There are two types of dissonances, namely product and emotional. Impulsive buying behavior is found to impact product dissonance significantly (Chen et al., 2020). In online purchases, cognitive dissonance may occur due to a lack of control and physical interaction with products, while impulsive purchases make consumers vulnerable to post-purchase dissonance in live shopping (Lazim et al., 2020).

The publication shows that impulsive buying can lead to product dissonance, with consumers experiencing negative emotions such as disappointment and regret (Chen et al., 2020). Impulsive purchases, often made without thorough consideration, can lead to post-purchase dissonance, where consumers doubt the buying decisions and experience regret (Rodrigues et al., 2021; Lin et al., 2023; Barta et al., 2023). Therefore, impulsive buying behavior in live shopping environments filled with stimuli can increase consumers' risk of post-purchase dissonance. Based on these discoveries, the following hypothesis is proposed.

H7: Impulsive buying behavior positively influences post-purchase dissonance.

II. METHODS

Descriptive statistics are used to analyze quantitative data through statistical measures such as mean, minimum, maximum, and standard deviation. Data are collected cross-sectionally in Indonesia over two months (from November to December 2023). Then, a pilot test is further conducted to validate the questionnaire and the feedback on clarity as well as ambiguity is used to refine the questions. Furthermore, the unit of analysis comprises individuals who have watched live shopping for at least 15 minutes in the

last two months.

Responses are collected using convenience sampling, and a 5-point Likert scale is systematically compiled through the Google Forms platform. The dimensions of IT affordances, including visibility, metavoicing, guidance shopping, and interactivity, are measured using an adapted scale proposed by (Dong & Wang, 2018), with each dimension evaluated using four indicators. Flow experiences are measured with five indicators from Dong et al. (2022) and Hong et al. (2016), while perceived scarcity is assessed with five indicators adapted from Broeder and Wentink (2022) and Zhang et al. (2022). Four items measuring impulsive buying behavior are taken from Park et al. (2012) and Ming et al. (2021). Then, four items to assess post-purchase dissonance are taken from Koller and Salzberger (2007).

The research analyzes the data using Partial Least Squares - Structural Equation Modeling (PLS-SEM) in SmartPLS 4.0, incorporating a two-stage method: (a) testing the measurement properties of the constructs and (b) testing the proposed hypotheses in the structural model. Then, hypothesis testing is conducted after confirming that the measurements meet reliability and validity requirements. The testing focuses on evaluating the relationships between variables in the model. In addition to verifying the statistical significance ($p < 0.05$), the path coefficient and the R^2 value are examined. A weight near 0 shows a weak relationship, while a weight near +1 (or -1) suggests a strong positive (or negative) relationship. Concurrently, R^2 values range from 0 to 1, with higher values suggesting greater explanatory power, leading to a more favorable outcome. The explanatory power of R^2 values of 0.75, 0.50, and 0.25 are categorized individually as strong, moderate, and low, respectively.

Next, bootstrapping with 5,000 sub-samples is further used to test the hypotheses according to the study model in Figure 1. A one-tailed statistical test is used to verify the hypotheses. The moderating effect is also tested using the interaction method and simple slope analysis.
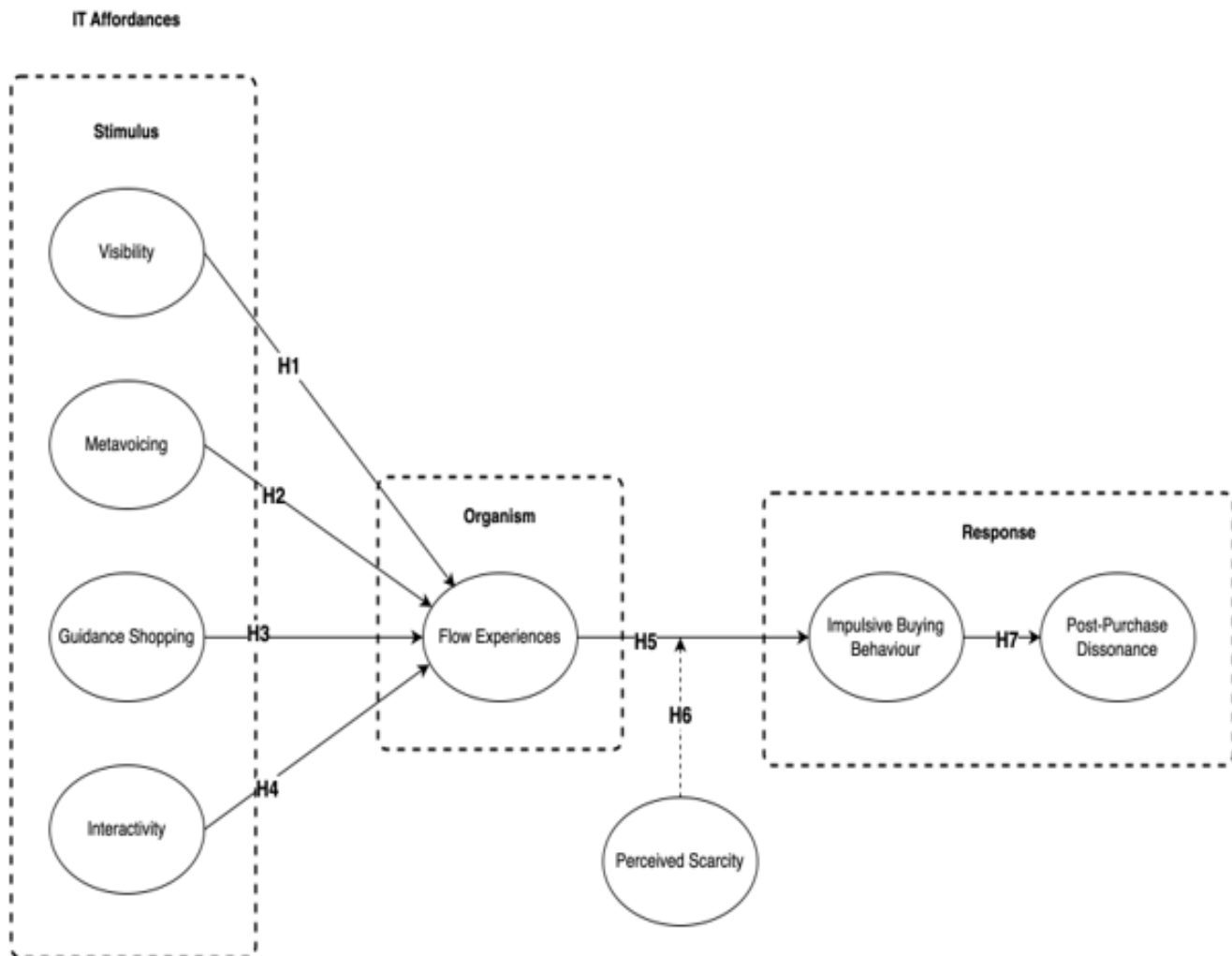

Figure 1 Theoretical Model

III. RESULTS AND DISCUSSIONS

Among the 349 survey respondents, 299 meet the screening criteria, and 250 responses are used after further cleaning. The majority of respondents are observed to be women (60%), with most (82%) being within the age range of 18-30 years. The remaining 18% are aged between 31-43 years. The respondents primarily consist of private employees (57%), followed by students (14%), government employees (14%), and entrepreneurs (13%). Frequent watchers who watch live shopping 5 to 10 times per month make up 65% of the respondents, while 28% watch less than 5 times monthly.

The measurement items are tested for reliability and validity before the questionnaire is distributed. The reliability test results show that all items met Cronbach's Alpha (CA) and Composite Reliability (CR) criteria, both greater than 0.7. The validity test suggests that all items have factor loading exceeding 0.7 and are statistically significant with an Average Variance Extracted (AVE) ≥ 0.5. These results confirm that all variables meet the requirements of reliability and validity testing (Hair Jr. et al., 2021), as shown in Table 1.

Discriminant validity is assessed, showing that the Heterotrait-Monotrait (HTMT) value does not exceed the threshold of 0.9 (Henseler et al., 2015), as

Table 1 Construct Reliability and Validity

Variable	Items	Factor Loading	CA (> 0.7)	CR (> 0.7)	AVE (> 0.5)
Visibility	VIS1	0.759	0.792	0.865	0.615
	VIS2	0.810			
	VIS3	0.801			
	VIS4	0.766			
Metavoicing	MTA1	0.716	0.817	0.879	0.647
	MTA2	0.795			
	MTA3	0.856			
	MTA4	0.842			
Guidance Shopping	SGD1	0.712	0.807	0.874	0.635
	SGD2	0.865			
	SGD3	0.768			
	SGD4	0.835			
Interactivity	ITV1	0.803	0.810	0.875	0.637
	ITV2	0.791			
	ITV3	0.823			
	ITV4	0.773			
Flow Experience	FLW1	0.808	0.848	0.892	0.622
	FLW2	0.795			
	FLW3	0.787			
	FLW4	0.790			
	FLW5	0.764			
Perceived Scarcity	PSC1	0.783	0.841	0.887	0.612
	PSC2	0.747			
	PSC3	0.805			
	PSC4	0.774			
	PSC5	0.801			
Impulsive Buying Behavior	IBB1	0.806	0.831	0.888	0.664
	IBB2	0.840			
	IBB3	0.823			
	IBB4	0.790			
Post Purchase Dissonance	PPD1	0.825	0.820	0.881	0.650
	PPD2	0.819			
	PPD3	0.762			
	PPD4	0.816			

Note: Cronbach's Alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE)

detailed in Table 2. The result confirms the discriminant validity of the measurement items of each construct.

Figure 2 shows the full PLS-SEM (outer and inner) model used in the research. Analysis of the data supports six hypotheses except for H3 (guidance shopping → flow experiences, $t = 1.000$, $t < 1.64$) as detailed in Table 3. The R^2 value shows that the components of IT affordances effectively predict flow experiences. Furthermore, flow interacts significantly with perceived scarcity, showing a strong predictive capability ($R^2 = 0.513$) for impulsive buying behavior. This model effectively predicts post-purchase dissonance through the examination of impulsive

buying behavior ($R^2 = 0.513$). Among the four dimensions of IT affordances, interactivity evolves as the strongest driver of flow experiences ($\beta = 0.276$), followed by visibility ($\beta = 0.156$), and metavoicing ($\beta = 0.108$). The impact of flow on impulse buying behavior is evident with a strong predictive power ($R^2 = 0.513$).

The testing of H6 on the moderating effect of perceived scarcity shows that it significantly influences the relationship between flow experiences and impulsive buying behavior. However, this effect is weak ($\beta = -0.068$, $t > 1.64$) and has a negative effect which is contrary to the hypothesis.

Table 2 Discriminant Validity – Heterotrait-Monotrait Value

	FLW	IBB	ITV	MTA	PPD	PSC	SGD	VIS	PSC x FLW
FLW									
IBB	0.823								
ITV	0.783	0.563							
MTA	0.599	0.665	0.554						
PPD	0.849	0.864	0.590	0.598					
PSC	0.869	0.741	0.617	0.511	0.808				
SGD	0.711	0.493	0.824	0.659	0.524	0.505			
VIS	0.698	0.535	0.651	0.637	0.592	0.546	0.834		
PSC x FLW	0.429	0.395	0.359	0.338	0.359	0.388	0.342	0.289	

Note: Visibility (VIS), Metavoicing (MTA), Guidance Shopping (SGD), Interactivity (ITV), Flow Experience (FLW), Perceived Scarcity (PSC), Impulsive Buying Behavior (IBB), and Post Purchase Dissonance (PPD)
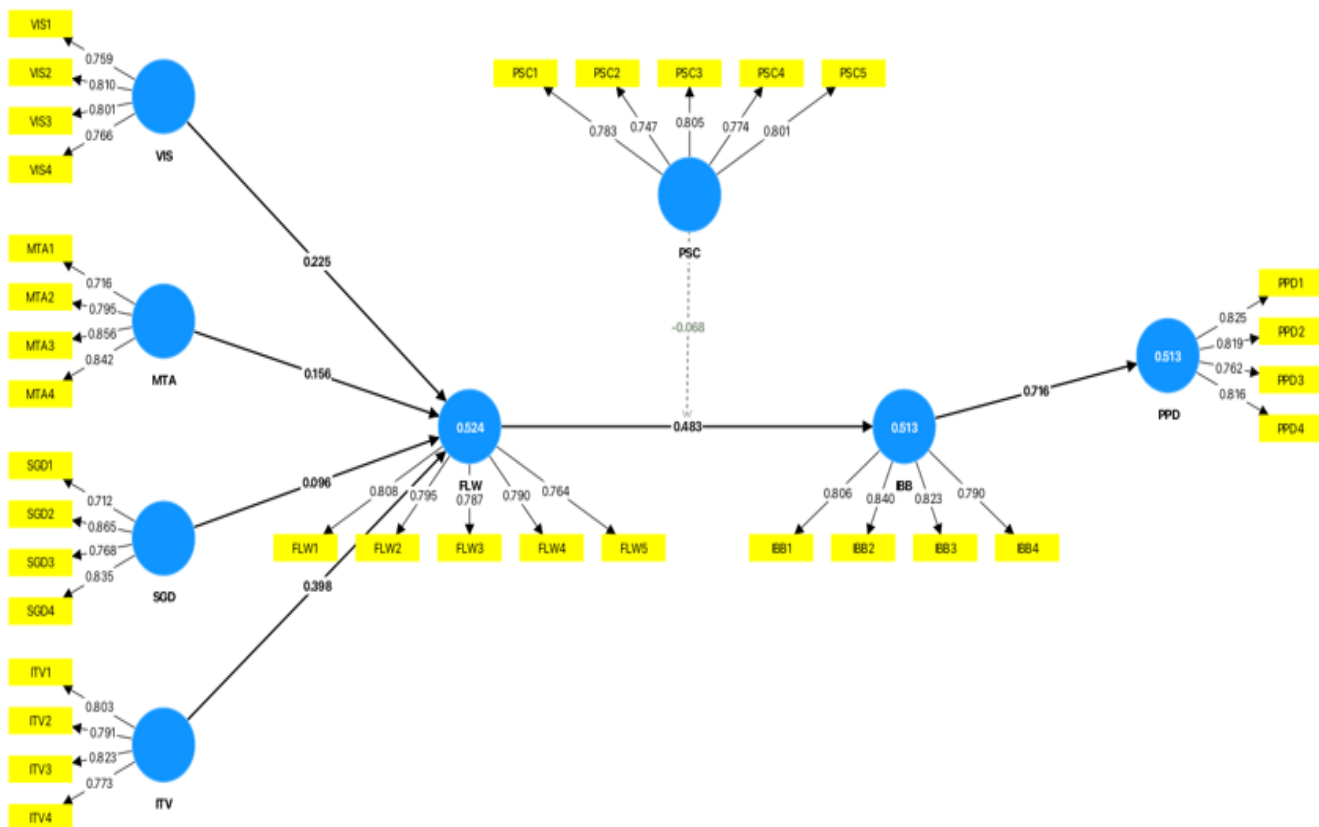

Figure 2 Full Model
(Path Coefficient & Factor Loading)

Table 3 Hypothesis Testing Result

Hypothesis	Path	R²	Path Coefficient	T-Values	Conclusion
H1	VIS --> FLW	0.524	0.483	2.629	supported
H2	MTA --> FLW		0.108	2.080	supported
H3	SGD --> FLW		0.096	1.000	not supported
H4	ITV --> FLW		0.276	5.359	supported
H5	FLW --> IBB	0.513	0.335	6.522	supported
H6	PSC x FLW --> IBB		-0.068	1.973	supported
H7	IBB --> PPD		0.497	17.253	supported

Note: Visibility (VIS), Metavoicing (MTA), Guidance Shopping (SGD), Interactivity (ITV), Flow Experience (FLW), Perceived Scarcity (PSC), Impulsive Buying Behavior (IBB), and Post Purchase Dissonance (PPD).
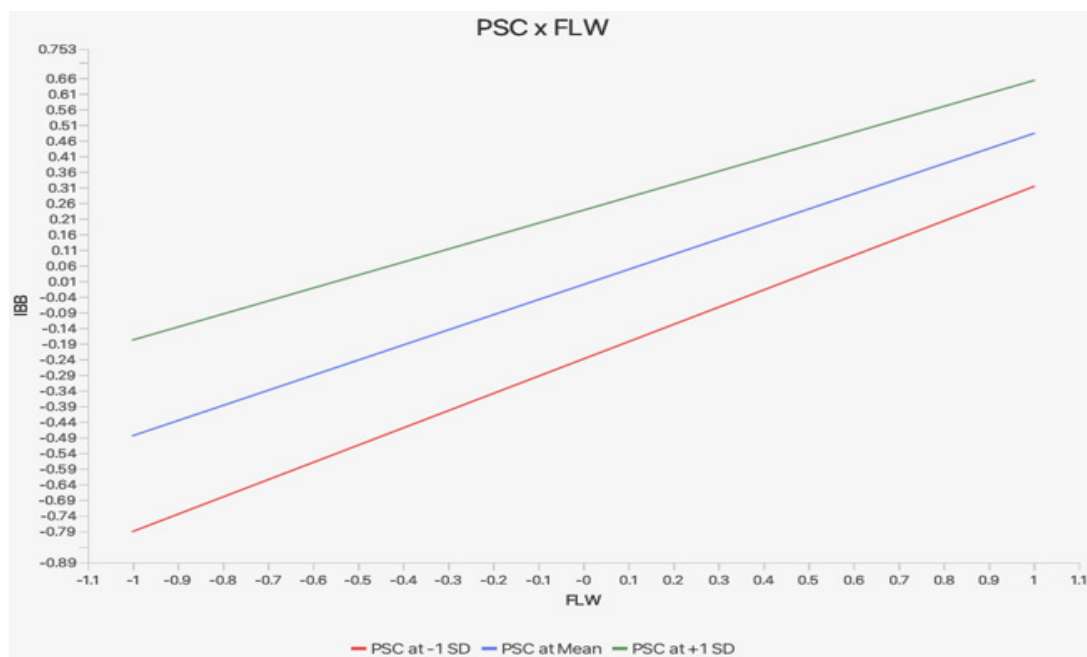

Figure 3 Slope Analysis

The effect suggests that perceived scarcity can decrease the influence of flow experiences on impulsive buying behavior. A simple slope plot analysis (see Figure 3) confirms the results and shows similar outcomes. The green line in the results shows that higher perceived scarcity hinders the influence of flow experiences on impulsive buying behavior. Conversely, the red line suggests that lower perceived scarcity strengthens the influence of flow experiences on impulsive buying behavior.

The results show that increased visibility in live shopping contributes to a more profound buying experience for consumers. Clear and prominent activities in live shopping are instrumental in generating flow experiences for users. This result is consistent with the theory in Tuncer (2021) that emphasizes the importance of providing comprehensive product information to aid consumers in making informed buying decisions. High-quality pictures and video demonstrations increase product appeal, enhancing consumers' interest and immersion in live shopping

events.

Metavoicing in the form of feedback or reviews engages consumers in current discussions about the shopping experiences, thereby promoting sustained flow experiences (Zhang et al., 2023). This engagement keeps consumers focused and engaged during live shopping activities continuously, facilitating more profound flow experiences (Sun et al., 2019). A given rate that appears directly on the screen without moving pages can provide instant feedback to live shopping streamers and other users. It can be an additional motivation for users to engage more deeply in live shopping activities.

Contrary to expectations, the research finds no support for the influence of shopping guidance on flow experiences. Effective guidance shopping should customize responses to individual consumers' needs. The result implies that guidance shopping should be able to answer questions and solve the needs of consumers in a personalized manner (Tuncer, 2021). However, the research finds that the platform

guidance often fails to deliver personalization assistance for consumers' requests. Misinformation or irrelevant guidance can further lead to confusion among consumers and hinder the ability to find desired products or obtain necessary information. These conditions disrupt flow experiences and further disengage consumers from live shopping activities (Chandrruangphen et al., 2021).

Interactivity in live shopping helps to create a more profound consumer shopping experience (Liu et al., 2022). The results show that a higher level of interactivity increases the possibility for users to experience flow. It emphasizes the importance of active interaction between users and streamers as live shopping can develop a deep shopping experience for users. The interaction between buyers and sellers also produces an intense dynamic that gives consumers a sense of independence from reality, removes anxiety, and is more immersed in a shopping experience with a high level of immersion (Liu et al., 2022; Dong et al., 2022). Live shopping platform companies can further add a product voting feature where users participate in a favorite product or event theme selection. The platform can also provide a live voting option or polling feature and publish the results directly to enhance user engagement. Additionally, companies add Group Buying features by motivating users to shop together and offering special discounts when several consumers buy products simultaneously. By implementing these features, live shopping platforms can develop a more dynamic and engaging experience stimulating interaction between event organizers, sellers, and users.

Consumers who are fully immersed in live shopping environments have more probability of exhibiting impulsive buying behavior, which is strongly stimulated by the environment. Furthermore, flow experiences have the potential to make an unplanned buying due to a feeling of being highly engaged and an increase in positive emotions during live shopping sessions. It further increases the tendency of consumers to engage in impulsive shopping (Wu et al., 2020).

Post-purchase restlessness often originates from hasty decisions made without thorough consideration (Lazim et al., 2020; Barta et al., 2023). Doubts about buying decisions or feelings of misallocation of funds can signal impulse-driven purchases (Chen et al., 2020). Furthermore, perceived scarcity can diminish the impact of flow experiences on impulsive buying behavior. It can be because awareness of scarcity develops a form of internal disruption that distracts attention from continuous flow experiences. In the context of live shopping, the disruption of live shopping users can cause flow interruption. Users whose attention is not on shopping are more inclined to engage in rational evaluations rather than impulsive buying behavior. It will decrease the influence of flow and reduce the tendency to be impulsive. Additionally, sellers should strategically manage user experiences to mitigate distractions caused by perceived scarcity.

It will ensure consistency in information delivery and offer compelling alternatives rather than simply emphasizing limited stock.

IV. CONCLUSIONS

In conclusion, the research aims to examine how IT affordances, including visibility, metavoicing, guidance shopping, and interactivity, enhance consumers' flow experiences, such as concentration and immersion, influencing impulsive buying behavior. During the examination, perceived scarcity is found to negatively moderate the impact of flow experiences on impulsive buying behavior. The research further contributes to advancing the S-O-R model in the context of live shopping, particularly by exploring the theoretical role of perceived scarcity. Visibility, metavoicing, and interactivity are also found to foster a positive environment conducive to exploring live shopping experiences, with interactivity evolving as the most critical driver of flow. However, no significant influence of shopping guidance on flow creation is observed.

Although the research focuses on users of the entire e-commerce live shopping platform, it recognizes the potential influence of cultural variations, demographic differences, social characteristics, and economic conditions across different regions in Indonesia. The results provide valuable insights but require careful consideration when generalizing to represent diverse live shopping behavior across the country. Future research should examine regional differences more deeply to understand variations in live shopping responses better.

Given the outcome that perceived scarcity can diminish the relationship between flow experiences and impulsive buying behavior, future research can explore contextual limitations by exploring how perceived scarcity operates within specific products or platforms. Additionally, expanding the scope to investigate the relationship between impulsive buying behavior and post-purchase dissonance, possibly considering moderating factors, such as materialism, can provide new insights. Materialistic tendencies have also been shown to influence feelings of regret over buying decisions, impacting emotions and daily well-being, thereby offering a promising avenue for studies in the domain of live shopping.

Furthermore, future research can explore advanced responses to post-purchase dissonance, such as examining consumers' decisions regarding product returns. Research on product returns can offer practical insights into managing return rates originating from consumer dissatisfaction. It can further affect the profitability and reputation of the company's brand. This line of inquiry can inform companies in designing more effective and sustainable after-sales policies.

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Data Availability Statement: Data are available from the corresponding author, E. R. S., upon reasonable request.

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