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Environmental Stimuli and Consumer Arousal in E-Commerce: An S-O-R Framework Analysis

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ABSTRACT

The rapid expansion of e-commerce platforms has fundamentally transformed consumer shopping behavior, yet empirical research examining the psychological and emotional responses within this digital environment remains limited. Grounded in the Stimulus-Organism-Response (S-O-R) theory, this study investigates the key factors influencing consumer arousal among online shoppers in a highly urbanized region of Malaysia. Utilizing a quantitative, correlational research design, data were collected from 129 active e-commerce users via an online survey. The statistical analysis reveals that economic benefits, visual factors, time pressure, and social influence all possess a significant and positive impact on consumer arousal. The study finds that among the evaluated environmental stimuli, economic benefits serve as the strongest predictor of emotional engagement, highlighting the dominance of financial incentives in shaping online consumer psychology. The study provides robust empirical support for the S-O-R framework in digital retail. It offers actionable insights for e-commerce marketers and application developers to strategically leverage these environmental stimuli and emotional triggers during the pre-purchase stage to enhance customer engagement.

Keywords: Consumer Arousal, E-commerce, S-O-R Framework, Online Consumer Behavior, Digital Marketing.

INTRODUCTION

The global e-commerce industry has grown incredibly fast, thanks to new technology and how people shop these days. This digital shift is expected to become massively huge economically global online retail sales are constantly increasing and it is all because of things like artificial intelligence, machine learning, and pricing strategies that try to give shoppers a really personalized experience (AG et al., 2024). In Malaysia, digital retail is becoming more popular very quickly. According to Horn and Gifford (2022), the country has a highly connected population with people using the internet for shopping more and more. The market is mostly run by mobile-first platforms that use cool features like flash sales, personalized recommendations, and live streaming (Raharja, 2025). These online marketplaces have totally changed how people shop, turning it from just buying something into an engaging, fun activity. But, while everyone knows a lot about the basic structure of e-commerce and how things are bought and sold, there is not much research on how shoppers actually feel specifically, their level of excitement. Consumer arousal meaning a state where people feel really excited, anticipating something, and stimulated is a big part of making decisions when shopping online (Cao et al., 2024). Today's digital marketing often uses design and deals to make people feel intense emotions and

encourage impulse buys. As stated by Guha Sarkar and Mehta (2026), retailers carefully set up these digital environments using things like limited-time offers, attractive designs, countdown timers, and seeing what other people are buying to deliberately build this excitement while that is browsing.

However, many studies just talk about consumer behavior generally without focusing on the actual feelings people have right before they make a purchase. Much of the research focuses on what happens after someone buys something like whether they are happy with their purchase or if they will buy from that brand again leaving people with a big lack of information about what triggers those feelings immediately beforehand (Khan et al., 2025).

So, this study wants to look at how people feel when shopping online in the Klang Valley, Malaysia, and figure out which things such as time pressure, getting a good deal, social influence, and visual factors are most likely causing that emotional response. The Klang Valley which includes Kuala Lumpur, Selangor, and Putrajaya is a really great place to study this because it is densely populated, has lots of people with internet access, and is a major center for digital businesses in the country (Yasin et al., 2022). Using the S-O-R framework, this research will give people a good look at how specific digital things affect how people feel, which ultimately drives shopping behavior online.

LITERATURE REVIEW

According to Ismail et al. (2026), Selangor (21.6%) recorded the highest population in the first quarter of 2026. However, Putrajaya with 120.9 thousand population and Kuala Lumpur city had a population of 2,083.5 thousand (Kozlowski et al., 2022). The Shopee app included online reviews and ratings that had a significant impact on purchase decisions (Octavia & Wijaya, 2025). Positive reviews and high ratings enhance consumer trust and influence their buying choice (Sung et al., 2023). The role of influencers such as artist celebrities, TikTokers, and YouTubers was noted as a positive factor in shaping purchase decisions among Shopee users (Fitria et al., 2024).

According to Rafdinal et al. (2025), arousal was a psychological situation marked by increasing happiness or anticipation, which significantly influences consumer decision-making, especially during flash sales. The combination of limited quantity scarcity and limited time scarcity can create arousal that creates impulsive buying (Suwito & Susilowati, 2025). The crucial in prompting impulsive purchases during flash sales in e-commerce was arousal. Another consideration, where a person feels interested, more dynamic, or passionate, and has a strong area of strength for the product presented in a shopping situation, was arousal (Seijts & Milani, 2024).

From previous studies, less academic study has been done on consumers' emotional and psychological reactions, especially their level of arousal, which was a significant factor that influences their online behaviour (Zhu et al., 2023). Since the focus of this empirical research was exclusively on the emotional arousal consumer factors during browsing or interacting with the Shopee platform, post-purchase behaviour such as product satisfaction, delivery service, or customer service interactions not be examined in the survey (Hsiao, 2022).

This research is supported by the Stimulus-Organism-Response (S-O-R) theory, which posits that external environmental stimuli (S) trigger internal physiological and psychological processes (O), which subsequently drive behavioral responses (R). In this context, platform-driven marketing variables act as the stimuli, while consumer arousal represents the internal organismic state.

Underpinning Theory: Stimulus-Organism-Response (S-O-R) theory

The Stimulus-Organism-Response (S-O-R) theory is basically how people understand why digital marketing things get people excited when they are shopping online (Ligaraba et al., 2023). The S-O-R model says that outside things what people call stimuli and trigger feelings inside people, and those feelings then make people do something (Wang et al., 2024). In e-commerce, this idea really focuses on the fact that a shopper's emotional state is the biggest thing driving how they react to what's happening on the platform before they actually buy anything (Chaudhary et al., 2025).

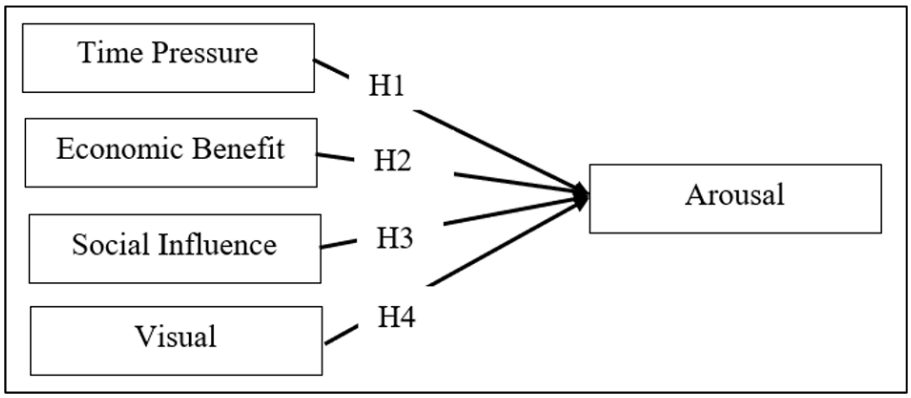


Figure 1. Research Framework. Source: (Adopted from My Ngo and Mai Le (2025)).

Variables Studied

The research looks at four different external stimuli and uses one main measurement of how someone feels psychologically as depicted in Figure 1:

- External Stimuli (S): The study looked at time pressure like countdown timers or limited-time offers economic benefits, such as discounts and vouchers, social influence through influencers and reviews, and visual factors like the design of the website and photos of products (Nursafitri et al., 2025).
- Organism (O): They defined “consumer arousal” as the emotional excitement, interest, and stimulation someone experiences while shopping online (Jialin et al., 2027).

Variable Relationships and Hypotheses

The theory suggests that each of those external stimuli increases a person's level of arousal (Sen, 2024). For example, when clearly a countdown timer or a limited-time offer, it creates a sense of urgency, making people rely more on how they feel than on thinking things through logically (Tiemessen et al., 2022). Similarly, discounts and vouchers make products seem more appealing, which boosts interest and excitement. Social influence like what influencers say or the reviews people write builds trust and makes people feel more connected, leading to increased emotional engagement (Ki et al., 2023). Finally, the way a website looks good design and attractive product photos captures attention and directly affects how much pleasure and arousal someone experiences (Jongmans et al., 2022).

Time Pressure

Time pressure creates a sense of urgency through limited-time offers and countdown timers (Nursafitri et al., 2025). Under time constraints, consumers rely more heavily on emotional cues rather than rational analysis, heightening their arousal and accelerating decision-making (Yang & Liu, 2026). Previous studies had consistently shown that time pressure significantly influences consumer emotions and behaviour. According to Liu et al. (2022), consumers under time constraints tend to rely more on emotional cues rather than rational analysis, resulting in heightened arousal and impulsive purchases. This was supported by Sun et al. (2023), who found that time pressure leads to an increase in

unplanned buying behaviour due to the emotional excitement it generates.

H1: There is a significant relationship between time pressure and consumer arousal.

Economic Benefits

Economic benefits encompass financial advantages such as discounts, vouchers, cashback, and package deals (Hermawan et al., 2024). These cost-saving incentives significantly enhance the attractiveness of a purchase, thereby elevating consumer excitement and arousal. Economic benefits refer to the shopping platform producing the special price, any benefits from the price discount and promotion, and other consumer preferential activities (Li & Chen, 2024). To attract consumers' arousal and need, adopt various promotion strategies such as price discounts, gifts, or coupons (Bondarenko & Vyshnivska, 2023). Based on these various conclusions, it was clear that the economic benefits have a crucial impact on consumer e-commerce behaviour. The present research assesses the effect of economic benefits on consumer arousal by structuring the research hypotheses (Liu et al., 2023).

H2: There is a significant relationship between economic benefits and consumer arousal.

Social Influence

Social influence refers to the impact of peers, online reviews, and social media influencers on consumer decision-making (Shah & Asghar, 2023). Positive reviews and influencer endorsements build trust and authenticity, significantly heightening emotional arousal and driving customer engagement (Julaeha, 2026). According to a prior study by Nyrhinen et al. (2024), young consumers were heavily influenced by online reviews, which can lead to consumers' arousal through impulsive buying decisions. According to Liu et al. (2025), the conclusion was that social factors significantly influence impulsive buying behaviour among youth.

H3: There is a significant relationship between social influence and consumer arousal.

Visual Factors

Visual factors include platform design elements, interactive videos, and aesthetic product photography (Liu, 2025). High-quality visual stimuli capture attention and effectively manipulate emotional states, contributing to increased consumer pleasure and arousal (Yang et al., 2025). Visual factors draw attention and emotion, and communicate product information. All of this contributes to a better consumer experience. Visual attractiveness in e-commerce can lead to impulse purchases (Chandrasekhar et al., 2024). The study by Riswanto et al. (2025) shows that using big data to analyse consumer behaviour in visual marketing suggests that tailored visual design was most effective in addressing consumer preferences and improving product visibility. Visuals had an impact on customer behaviour, especially in product presentation and marketing. Colour, design, and images significantly influence consumer perceptions and emotions, such as arousal (Gupta et al., 2025).

H4: There is a significant relationship between visual factors and consumer arousal.

RESEARCH METHOD

Research Design

A quantitative, correlational research design was employed as an explanatory framework to measure the relationships between the independent variables and consumer arousal.

Sampling and Population
The target population comprised individuals aged 18 and above with prior online shopping experience on the Shopee e-commerce platform, specifically encompassing private and government sector workers residing in the Klang Valley (Kuala Lumpur, Selangor, and Putrajaya). A non-probability convenience sampling technique was use for efficiency and accessibility. The sample size was determined a priori using G*Power software based on a linear multiple regression model (medium effect size of 0.15, alpha of 0.05, power of 0.95, and 4 predictors), establishing a minimum requirement of 129 respondents. Following data screening, which excluded 93 responses failing filter criteria and removed 3 outliers, 129 valid responses were successfully retained for analysis.

Measurement and Instrumentation
The primary data collection tool was a structured questionnaire consisting of 21 measurement items derived from established consumer behavior research, utilizing a 5-point Likert Scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The instrument measured the following variables: *Time Pressure*: Assessed using 4 items to gauge the perceived urgency of limited-time offers and countdown timers. *Economic Benefits*: Evaluated through 5 items focusing on the attractiveness of discounts, promotional offers, and financial savings. *Social Influence*: Measured using 4 items evaluating the impact of online reviews, friends, and peer recommendations. *Visual Factors*: Assessed via 4 items targeting the aesthetic appeal and display of product information on the platform. *Consumer Arousal*: The dependent variable, measured with 4 items capturing feelings of excitement, pleasure, and emotional stimulation during the shopping process.

Validity and Reliability
The validity of the instrument was confirmed through a pretesting phase involving two academic experts and two respondents mirroring the target population's characteristics. Instrument reliability was initially evaluated via a pilot test involving 110 respondents. During the primary analysis, internal consistency was verified using Cronbach's Alpha, with all measurement scales demonstrating good to excellent reliability (values ranging from 0.842 to 0.913, safely above the 0.70 acceptable threshold).

Data Collection
Data were collected utilizing an online survey distributed via Google Forms. The survey link was shared across networks including friends, neighbors, offices, and university campuses. Ethical considerations were strictly maintained, ensuring respondent anonymity, data confidentiality, and voluntary consent prior to participation.

Data Analysis
Data screening and statistical analyses were performed using IBM SPSS software. The data were first screened to confirm the absence of blank responses, straight-lining, and extreme outliers. The formal analysis plan included descriptive statistics to profile demographics and variable distributions. Pearson correlation analysis was executed to examine the strength and direction of relationships between the independent variables and consumer arousal. Finally, multiple linear regression analysis was applied to test the hypotheses, ascertain the model's overall explanatory power, and identify the most significant predictive factors influencing the online shopper's emotional state.

RESULTS

4.1 Demographic Profile

The sample ($N = 129$) was predominantly female (55.0%), single (57.4%), and held a Bachelor's Degree (44.2%). The largest age cohort was 26-35 years old (40.3%), representing young adults highly familiar with digital technologies and mobile applications. A significant portion of respondents resided in Selangor (60.5%) and reported shopping online 1-3 times per month (34.9%) as shown in Table 1.

Table 1.
Demographic Profiling.

Variable	Category	Frequency (N=129)	Percentage (%)
Gender	Male	58	45.0
	Female	71	55.0
Age	18-25 years	39	30.2
	26-35 years	52	40.3
	36-45 years	26	20.2
	45 years and above	12	9.3
Marital Status	Single	74	57.4
	Married	50	38.8
	Divorced	4	3.1
	Widowed	1	0.8
Level of Education	SPM	18	14.0
	STPM/Foundation/Diploma	36	27.9
	Bachelor's Degree	57	44.2
	Master's Degree	15	11.6
	PhD	3	2.3
Shopping Frequency per Month	1-3 times	45	34.9
	4-6 times	39	30.2
	7-10 times	26	20.2
	More than 10 times	19	14.7
Current Location	Kuala Lumpur	31	24.0
	Selangor	78	60.5
	Putrajaya	20	15.5

Descriptive Statistics
All constructs exhibited high mean scores as depicted in Table 2 below, indicating positive perceptions among respondents. Economic Benefits recorded the highest mean ($M = 4.26,\ SD = 0.49$), followed by Visual Factors ($M = 4.19,\ SD = 0.48$), Consumer Arousal ($M = 4.18,\ SD = 0.51$), Time Pressure ($M = 4.08,\ SD = 0.53$), and Social Influence ($M = 3.98,\ SD = 0.56$). Reliability analysis confirmed that all measurement scales demonstrated strong internal consistency, ensuring the data's suitability for inferential testing.

Table 2.
Descriptive statistics results.

Variable	Mean	Standard Deviation (SD)	Interpretation
Time Pressure	4.08	0.53	High
Economic Benefits	4.26	0.49	High
Social Influence	3.98	0.56	High
Visual Factors	4.19	0.48	High
Consumer Arousal	4.18	0.51	High

Hypothesis Testing

Reliability analysis confirmed that all measurement scales demonstrated strong internal consistency, with Cronbach's Alpha values ranging from 0.842 to 0.913, safely above the 0.70 threshold.

Regression Model Overview
Pearson correlation analysis revealed that all four independent variables shared positive, statistically significant relationships with consumer arousal ($p < 0.01$) as shown in Table 3.

Table 3.
Pearson Correlation Matrix

Variables	TP	EB	SI	VS	AR
Time Pressure (TP)	1.000				
Economic Benefits (EB)	.482**	1.000			
Social Influence (SI)	.441**	.556**	1.000		
Visual Factors (VS)	.394**	.582**	.468**	1.000	
Consumer Arousal (AR)	.632	.711	.571	.683	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

Multiple linear regression assessed the predictive strength of these stimuli. The overall model was statistically significant ($F = 57.540$, $p < 0.001$) and successfully explained 65.0% of the variance in consumer arousal ($R^2 = 0.650$) as shown in Table 4 and Table 5 respectively.

Table 4.
Model Summary (Multiple Linear Regression)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.806	0.650	0.639	0.309

Table 5.
Multiple Linear Regression Coefficients.

Variable	Unstandardized B	Std. Error	Standardized Beta	t-value	Sig.
Constant	0.518	0.231	-	2.242	0.027
Time Pressure	0.224	0.059	0.231	3.810	0.000
Economic Benefits	0.336	0.060	0.346	5.620	0.000
Social Influence	0.159	0.055	0.167	2.910	0.004
Visual Factors	0.279	0.060	0.284	4.670	0.000

H1: Time Pressure and Consumer Arousal
The S-O-R framework suggests that time-limited promotions create external urgency that influences internal emotional states. The regression results supported Hypothesis 1, revealing that time pressure significantly predicts consumer arousal ($\beta = 0.231$, $t =$

$3.810, p < 0.001$). Consumers who perceive stronger time constraints through flash sales and countdown timers experience heightened excitement and emotional stimulation during the online shopping process (Nursafitri et al., 2025).

H2: Economic Benefits and Consumer Arousal
Hypothesis 2 posited that financial incentives stimulate emotional interest. This hypothesis was supported, with economic benefits emerging as the strongest predictor of consumer arousal across the entire model ($\beta = 0.346, t = 5.620, p < 0.001$). Attractive discounts, cashback offers, and free shipping campaigns serve as powerful external stimuli that maximize the perceived value of a purchase, thereby generating the highest levels of emotional engagement (Novadinastia & Rusdianto, 2026).

H3: Social Influence and Consumer Arousal
Hypothesis 3 examined the emotional impact of peers, reviews, and influencers. The analysis supported this hypothesis, showing that social influence has a statistically significant, albeit the weakest, predictive relationship with consumer arousal ($\beta = 0.167$, $t = 2.910, p = 0.004$). While consumers are emotionally stimulated by online reviews and influencer recommendations, this factor acts more as a supporting mechanism compared to direct financial or visual stimuli (Bui et al., 2025).

H4: Visual Factors and Consumer Arousal
Hypothesis 4 stated that aesthetic interface design and product displays manipulate emotional pleasure. The data supported this hypothesis, establishing visual factors as the second-strongest predictor of arousal ($\beta = 0.284,\ t = 4.670,\ p < 0.001$). Visually attractive product presentations, appealing layouts, and high-quality imagery serve as critical environmental stimuli that significantly increase consumer excitement and engagement (Florea et al., 2025).

Pearson correlation analysis revealed that all four independent variables shared positive, statistically significant relationships with consumer arousal ($p < 0.01$). Multiple linear regression was subsequently conducted to assess predictive strength. The overall model was statistically significant ($F = 57.540, p < 0.001$) and explained 65.0% of the variance in consumer arousal ($R^2 = 0.650$). Table 4 summarizes the hypothesis testing.

Table 6.
Summary of Hypothesis Testing.

Hypothesis	Relationship	Standardised Beta (β)	t-value	Sig.	Decision
H1	Time Pressure -> Consumer Arousal	0.231	3.810	0.000	Accepted
H2	Economic Benefits -> Consumer Arousal	0.346	5.620	0.000	Accepted
H3	Social Influence -> Consumer Arousal	0.167	2.910	0.004	Accepted
H4	Visual Factors -> Consumer Arousal	0.284	4.670	0.000	Accepted

- **H1 (Time Pressure):** Supported. Time pressure significantly predicted arousal ($\beta = 0.231$, $p < 0.001$).
- **H2 (Economic Benefits):** Supported. Economic benefits emerged as the strongest predictor of arousal ($\beta = 0.346$, $p < 0.001$).
- **H3 (Social Influence):** Supported. Social influence exhibited a significant, albeit the weakest, predictive relationship ($\beta = 0.167$, $p = 0.004$).
- **H4 (Visual Factors):** Supported. Visual factors served as the second-strongest predictor ($\beta = 0.284$, $p < 0.001$).

DISCUSSION

The findings demonstrate a high level of consumer arousal ($M = 4.18$) among users, indicating that the digital platform effectively cultivates an emotionally engaging shopping environment. This provides robust empirical validation for the Stimulus-Organism-Response (S-O-R) framework, proving that external marketing stimuli deliberately designed by online platforms successfully trigger internal emotional responses prior to behavioral outcomes. These results align with Xu et al. (2023), who emphasize that arousal is a fundamental emotional dimension influencing online consumer behavior, and Liu et al. (2025), who found that emotionally stimulating retail environments encourage prolonged browsing and higher purchase intentions. Furthermore, the findings are consistent with Sobouti and Karimi Alavijeh (2024), confirming that dynamic digital content enhances consumers' emotional experiences.

Economic benefits emerged as the most dominant factor driving arousal ($\beta = 0.346$), highlighting that consumers in the Malaysian e-commerce landscape are highly price-conscious due to rising living costs and inflation. Promotional campaigns (e.g., cashback, free shipping, flash sales) do not merely provide financial utility, but generate active psychological excitement as consumers maximize their spending value. This finding is consistent with Shih et al. (2024), who demonstrated that perceived economic benefits significantly influence emotional responses by enhancing perceived value. It also supports Utama et al. (2025), who established that financial incentives like discounts and vouchers effectively stimulate consumer interest, emotional satisfaction, and excitement during online shopping.

Visual factors were the second most influential stimulus ($\beta = 0.284$), affirming that high-quality imagery and aesthetic interfaces are critical psychological triggers that compensate for the inability to physically inspect products. A visually appealing interface enhances shopping enjoyment and trust. This corroborates previous empirical research by Bui et al. (2025), which reported that visually attractive digital environments significantly enhance emotional engagement and purchase intentions. Additionally, the results support Florea et al. (2025), demonstrating that well-designed layouts, professional product photography, and personalized visual marketing improve consumers' product evaluations and emotional attachment to retail platforms.

Time pressure effectively stimulated urgency and excitement ($\beta = 0.231$), validating scarcity-based marketing mechanisms such as flash sales and countdown timers. This urgency limits extensive rational deliberation, prompting consumers to rely on intuitive and emotional responses. This finding aligns directly with Guha Sarkar and Mehta (2026), who found that time pressure significantly heightens emotional responses and impulsive buying in e-commerce through affective processing. It also supports Tiemessen et al. (2022), who concluded that time-constrained consumers experience greater sensory arousal and exploratory shopping behavior.

Social influence provided the necessary trust and reassurance through peer reviews and influencer endorsements, presenting a statistically significant relationship ($\beta = 0.167$).

Although it was the weakest predictor, it remains essential in reducing perceived risk and building confidence, which in turn fosters positive emotional anticipation. This finding is supported by Fitria et al. (2024), who reported that credible influencers significantly impact consumer trust and emotional bonds, as well as Sung et al. (2023), who noted that social proof boosts customer engagement through emotional responses. Furthermore, it aligns Julaeha (2026), demonstrating that online reviews provide crucial emotional reassurance when physical product evaluation is impossible.

CONCLUSION, IMPLICATIONS AND FUTURE RESEARCH

Conclusion

This study successfully achieved its primary objective: figuring out what factors influence how excited online shoppers are in the Klang Valley. It really answered the research questions where the findings show that consumer arousal in e-commerce is a complex thing, and it's mostly driven by four external things. Economic benefits are the biggest trigger for emotional engagement (H2), followed closely by the way things look visually (H4). Plus, time pressure really does stimulate urgency and excitement (H1), while social influence gives people crucial emotional reassurance through things like peer reviews and influencer recommendations (H3). These results confirm the Stimulus-Organism-Response (S-O-R) theory within the Malaysian digital retail context showing that a mix of environmental stimuli effectively triggers internal emotional excitement before someone actually buys something.

Practical Implications

E-commerce platforms, digital marketers, and online retailers should really be using integrated marketing strategies instead of just running isolated promotions. To get the most out of a consumer's emotional experience before they buy, businesses need to combine strong financial incentives like cashback, vouchers, and free shipping with visually captivating interfaces and high-quality product imagery. Also, putting in clear countdown timers to create a sense of urgency, along with integrated social proof such as real-time reviews and influencer collaborations, will build a really engaging and emotionally stimulating shopping environment that keeps customers interested over the long term.

Limitations and Future Research

This study is limited because it's cross-sectional, relied on just one e-commerce platform (Shopee), and was only done in the highly urbanized Klang Valley. Because consumer emotions and market dynamics change all the time, future research should use longer studies to track emotional arousal over time. Also, researchers should expand their sampling to include rural demographics and compare multiple e-commerce platforms to improve how well the results can be used across different socioeconomic contexts. Finally, future studies should add more S-O-R variables, such as perceived trust, website usability, and what happens after a purchase (like actual purchase intention, impulsive buying, or customer loyalty) to build a more complete model of digital consumer behavior.

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