

A MULTIDIMENSIONAL APPROACH TO DIGITAL CUSTOMER ENGAGEMENT: EMPIRICAL STUDY OF LIVE-STREAMING COMMUNICATION ATTRIBUTES

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Abstract

This study examines the impact of live-streaming on digital customer engagement by focusing on three key communication attributes: communication immediacy, interactivity, and visualization. The research investigates how these attributes influence cognitive, emotional, and behavioral engagement. A quantitative method was employed, using data collected through an online survey distributed to users who interact with brands via live-streaming platforms. The dataset was analysed using Partial Least Squares Structural Equation Modelling (SEM-PLS). The results indicate that communication immediacy and interactivity significantly affect all three dimensions of digital customer engagement. In contrast, visualization only has a significant impact on emotional engagement, while its influence on cognitive and behavioral engagement is not supported. These findings suggest that not all live-streaming features equally drive customer engagement. The study contributes to the growing literature on digital engagement and provides practical insights into how brands can strengthen real-time interactivity and emotional resonance to foster deeper consumer involvement.

Keywords: Live-streaming; digital customer engagement; communication immediacy; interactivity; visualization

JEL Classification: M31, M37, L81, O33

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INTRODUCTION

In the current era of accelerated digital transformation, organizations are increasingly compelled to innovate in their approaches to consumer engagement across diverse online ecosystems (Bughin, J., Chui, M., & Dietz 2023; Limited 2023). Among the most pivotal evolutions in digital marketing is the transition from conventional, unidirectional communica-

tion models to more immersive and participatory customer engagement frameworks (Shawky et al. 2020). Digital customer engagement (DCE) has thus emerged as a strategic construct reflecting how consumers cognitively, emotionally, and behaviorally interact with brands in digital environments (Barrett et al. 2024; Ng et al. 2020).

In Indonesia, the rapid expansion of digital media has transformed consumer behavior in significant ways. According to We Are Social Kemp (2021), more than 73% of Indonesians are active internet users, with 62.5% actively engaging with digital content via e-commerce platforms. Recent findings by Santika (2023) further reveal that nearly half of Gen Z consumers in the country have made impulsive purchases during live-streaming sessions, highlighting a pronounced behavioral tendency toward emotionally driven, unplanned buying. Moreover, the same study reports that a substantial majority of Gen Z, Millennials, and Gen X prefer smartphones as their primary device for video streaming, signaling a cultural shift toward mobile-first, content-centric engagement. Despite this momentum, many brands in Indonesia continue to rely on static, non-interactive content, overlooking the dynamic potential of live-streaming as a richer, more immersive medium for consumer engagement.

Live-streaming platforms such as TikTok Live and Shopee Live enable two-way communication, real-time interaction, and vivid product visualization, key drivers of customer trust and purchase intention (Lu & Chen 2021). While customer engagement continues to receive scholarly attention (Hollebeek et al. 2022), studies focusing on how live-streaming communication attributes affect multiple engagement dimensions remain limited.

Previous research has often examined either emotional or behavioral engagement in isolation or focused on general platform effects without analysing the role of specific communication mechanisms (Bapat & Hollebeek 2023; F. C. Tseng et al. 2022). Moreover, Xin et al. (2024) point out that the combined effects of interactivity and visual demonstration on engagement remain underexplored. Hence, there is a notable empirical gap, particularly in Indonesia, where live-streaming adoption is growing but still under-researched (Afifah et al. 2023; Putra & Hayadi 2024).

This study aims to address that gap by investigating how three key attributes of live-streaming, that is communication immediacy, interactivity, and visualization, influence the cognitive, emotional, and behavioral dimensions of digital customer engagement. By integrating these variables into a single model, this research contributes new empirical insights and offers practical guidance for brands navigating real-time digital environments.

LITERATURE REVIEW

This study draws upon Customer Engagement Theory as a central lens to examine how live-streaming features influence consumer interaction in digital contexts. As defined by Rather & Hollebeek (2021), customer engagement is a multidimensional construct that encompasses cognitive, emotional, and behavioral dimensions. These dimensions reflect how consumers interpret brand-related content, develop emotional connections, and exhibit participative behaviors such as sharing, commenting, or purchasing. In interactive digital environments like live-streaming platforms, these engagement dimensions become increasingly dynamic, context-sensitive, and measurable, thereby providing deeper insights into real-time consumer involvement.

Simultaneously, this study is grounded in Media Richness Theory, which posits that richer communication media, those enabling immediate feedback, multiple cues, and message personalization, enhance communication effectiveness and reduce ambiguity in digital interactions. In the context of online consumer behavior, media richness has been shown to play a significant role in shaping user experience and engagement. According to C. H. Tseng & Wei (2020), the effectiveness of mobile media richness varies across different stages of consumer behavior, being especially impactful during early phases such as attention and interest formation. Their study suggests that the strategic use of rich media features can effectively

influence consumers' decision-making journeys on digital platforms.

Furthermore, F. C. Tseng et al. (2022), demonstrate that media richness fosters online gamer loyalty through the mediating roles of social presence and customer engagement. In interactive digital environments like live streaming, the use of rich media cues, such as audiovisual interaction and real-time responsiveness, amplifies the sense of immersion and emotional connection, which are essential in building long-term engagement.

These insights collectively reinforce Media Richness Theory as a relevant applied framework to understand how live streaming features contribute to heightened digital customer engagement. With its real-time, two-way, and multi-sensory format, live-streaming embodies a high level of media richness that can significantly affect users' engagement levels (Xin et al. 2024).

Digital Customer Engagement

Digital Customer Engagement (DCE) has emerged as a pivotal construct in the digital age, reflecting how firms foster meaningful and sustainable relationships with their customers through digital interfaces. Unlike traditional transactional interactions, DCE encapsulates the cognitive, emotional, and behavioral dimensions that characterize how consumers think about, feel toward, and act upon brand-related content in online environments. As Srivastava et al. (2023) assert, DCE represents a strategic and multidimensional approach wherein customers actively participate in co-creating value through digital platforms such as social media, mobile apps, and brand websites. Cognitively, it involves a customer's focused attention and information processing regarding a brand's digital presence. Emotionally, it captures affective resonance and psychological connection, while behaviorally, it manifests in forms of active participation such as sharing content, commenting, and engaging in digital campaigns.

Hollebeek et al. (2022) stated through a comprehensive bibliometric analysis, observe that the landscape of customer engagement has transformed dramatically over the past fifteen years, driven by shifts in media use and technological affordances. Sandhu (2020) further emphasizes the role of digital innovations, including AI-powered personalization, interactive content, and gamified systems, in enriching digital customer experiences and enhancing engagement levels. Empirical studies reinforce this theoretical foundation. Bapat and Hollebeek (2023) stated for instance, demonstrate that perceived customer value significantly enhances engagement, which in turn strengthens brand equity, particularly in the context of digital payment platforms. Collectively, the current body of literature underscores that DCE is no longer a peripheral marketing tool but a core component of strategic brand management. Nevertheless, the field continues to face challenges related to measurement consistency and contextual adaptation, highlighting the need for a more refined and adaptive engagement framework in the ever-evolving digital ecosystem.

Communication Immediacy

Communication immediacy refers to the perceived real-time responsiveness and personal connection between a brand or streamer and its audience, significantly enhancing digital customer engagement across cognitive, emotional, and behavioral dimensions in live-streaming contexts. Immediacy promotes active information processing, as demonstrated by Lulu & Zolkepli (2024), who found that immediate interactions during live-streaming improve users' focus and comprehension. Xin et al. (2024) also reported that real-time engagement enhances viewers' ability to assimilate content, while Lu & Chen (2021) confirmed that timely feedback increases message clarity. Furthermore, communication immediacy fosters emotional connections by creating a sense of closeness, noted that responsive interact-

tions build trust and enthusiasm, and Xin et al. (2024) found that such interactions deepen emotional bonds with streamers. In addition, Lu & Chen (2021) highlighted that addressing viewers by name strengthens emotional attachment to the brand and content. Finally, immediacy drives active participation, such as commenting or purchasing, with Xin et al. (2024) and Lu & Chen (2021) finding that responsiveness from streamers increases viewer involvement.

H1: Communication Immediacy positively influences cognitive engagement.

H2: Communication Immediacy positively influences emotional engagement.

H3: Communication Immediacy positively influences behavioral engagement.

Visualization

Visualization refers to the visual richness and clarity of content delivered during live-streaming, which plays a vital role in shaping users' digital customer engagement across cognitive, emotional, and behavioral dimensions. Visual content supports cognitive engagement by enhancing understanding and reducing mental effort. Zheng et al. (2023) found that high-quality visual demonstrations help users better interpret product information. Jin & Ryu (2020) reported that visual clarity and structure reduce cognitive load, improving information absorption. Park & Yoo (2020) further highlighted that visually augmented elements, such as infographics or animations, increase analytical focus. Emotionally, visualization can trigger affective responses. Shin et al. (2024) observed that aesthetically pleasing visuals evoke feelings of enjoyment and connection. Wei et al. (2024) emphasized that facial expressions and body language captured through clear visuals contribute to emotional resonance, while Mavilinda et al. (2023) noted that visual storytelling enhances viewer empathy. In terms of behavior, visualization influences user actions such as likes, comments, and purchases. Chen & Wu (2023) demon-

strated that clear product visuals improve purchase intentions Xin et al. (2024) and that dynamic graphics stimulate real-time responses.

H4: Visualization positively influences cognitive engagement.

H5: Visualization positively influences emotional engagement.

H6: Visualization positively influences behavioral engagement.

Interactivity

Interactivity represents how reciprocal communication and audience participation are facilitated within live-streaming environments. It is a multidimensional enhancer of digital customer engagement by stimulating cognitive, emotional, and behavioral involvement. On a cognitive level, Interactivity encourages viewers to engage with content more deeply through real-time responses and immersive experiences. Joo & Yang (2023) emphasized that perceived Interactivity in live commerce environments enhances cognitive engagement by fostering immersion and user gratification. Similarly, Lv et al. (2022) found that visual stimuli and active participation in live sessions significantly support sustained mental engagement. Emotionally, interactivity cultivates a sense of presence, connection, and emotional resonance between users and streamers. Liu et al. (2022) reported that interactive elements such as live chat and feedback mechanisms stimulate emotional engagement by inducing flow experiences. Li et al. (2021) further noted that streamers' personalized greetings and direct acknowledgment heighten users' emotional attachment, making them feel valued and involved. Supporting this, Li et al. (2022) argued that interactive advertising enhances emotional satisfaction and enjoyment, shaping users' affective engagement toward digital content and brands. From a behavioral standpoint, Interactivity significantly drives user actions such as commenting, sharing, and purchasing in real-time. Riyanto (2021) iden-

tified that high-quality interaction during live-streaming sessions leads to impulsive buying behavior driven by user excitement and engagement. (Faradhilla et al. 2024), highlighted that Interactivity, when combined with informativeness and perceived relevance, reinforces trust and stimulates purchase behavior. Qin et al. (2023) also confirmed that dynamic streamer-viewer interaction patterns directly influence behavioral engagement, including click-through actions, content sharing, and platform loyalty.

H7: Interactivity positively influences cognitive engagement.

H8: Interactivity positively influences emotional engagement.

H9: Interactivity positively influences behavioral engagement.

[Figure 1](#) illustrates the proposed conceptual framework. The figure describe positions live-streaming as a medium that integrates three core affordances, that is communication immediacy, interactivity, and visualization. These are expected to shape customer engagement outcomes across cognitive, emotional, and behavioral dimensions.

RESEARCH METHODS

Research Design

This study adopts a quantitative research design to investigate how live-streaming experiences affect digital customer engagement. Quantitative methods are suitable for explaining behavioral phenomena using measurable data and for testing theoretical models statistically (Ghanad 2023). A descriptive statistical approach was applied to present demographic profiles and summarize patterns in digital interaction behavior, which is commonly used in consumer engagement studies (Barrett et al. 2024).

Population and Sample

Data were collected through an online questionnaire distributed to respondents

who have experience interacting with live-streaming content related to product marketing. The target population includes Indonesian consumers aged 18–35 who actively engage with live-stream shopping platforms such as TikTok Live, Shopee Live, or Instagram Live. Respondents were selected using a non-probability convenience sampling method, which is widely applied in digital marketing research due to its accessibility and relevance for exploratory analysis (Mubdir et al. 2025). A total of 218 valid responses were obtained via an online self-administered questionnaire using Google Forms.

Measurement

The variables in this study consist of six latent constructs: communication immediacy, interactivity, and visualization (as independent variables), and cognitive engagement, emotional engagement, and behavioral engagement (as dependent variables). Each construct was measured using reflective indicators adapted from established literature. A five-point Likert scale was used for all items, ranging from 1 (strongly disagree) to 5 (strongly agree). This scale is widely applied in behavioral research to capture degrees of agreement with perception-based statements (Hollebeek et al. 2022).

The number of indicators for each variable is as follows: communication immediacy (3 items, adapted from Clement Addo et al. 2021); interactivity (3 items, from (Lv et al., 2022); visualization (3 items, from Lu & Chen 2021); cognitive engagement (3 items, from Hollebeek et al. 2022); emotional engagement (5 items, from Hollebeek et al. 2022); and behavioral engagement (6 items, from Hollebeek et al. 2022). All items were slightly adapted to fit the live-streaming e-commerce context and were translated into Bahasa Indonesia using a back-translation procedure to ensure clarity and cultural relevance.

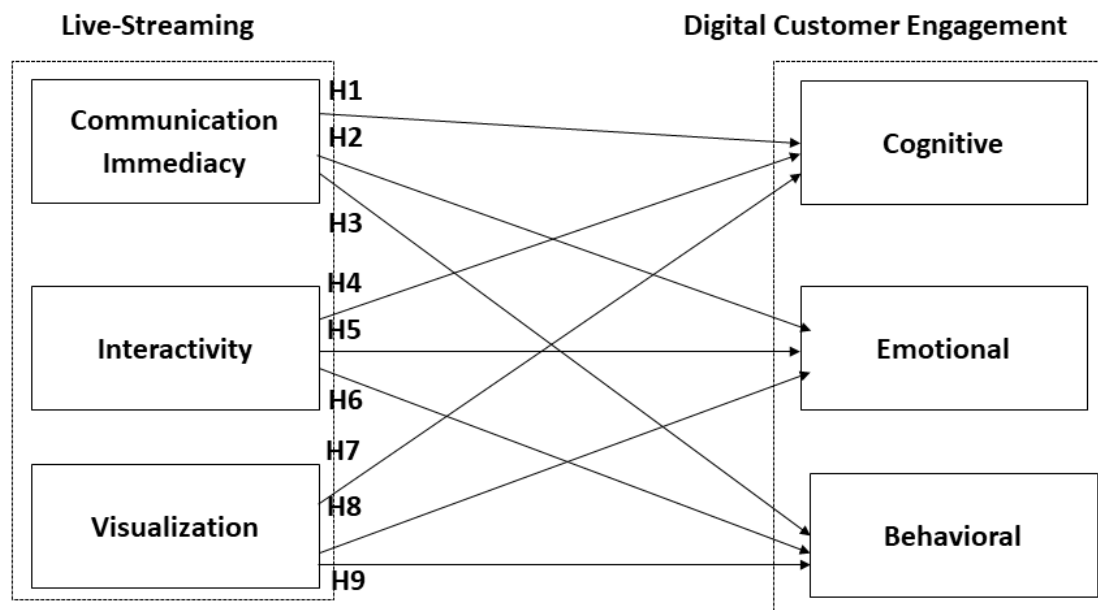


Figure 1. Research Model

Data Analysis

For data analysis, the study employed Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4. This method was chosen for its strength in handling complex models involving latent variables and its suitability for small to medium-sized samples without requiring multivariate normality (Hair et al. 2020, 2021). The analysis followed three key stages: (1) model specification, (2) evaluation of the measurement model, including indicator reliability, convergent and discriminant validity, and (3) evaluation of the structural model through hypothesis testing and predictive relevance. The sample size satisfies the heuristic minimum threshold, i.e., 10 times the number of indicators in the model (Hair et al. 2020).

RESULT AND DISCUSSION

Respondents' Profile

[Table 1](#) presents the demographic profile of the respondents involved in this study, which investigates the influence of live-streaming on digital customer engagement. Regarding gender distribution, the sample consisted of 117 males (53.7%) and 101 females (46.3%), indicating a relatively balanced gender composition with a slight male predominance.

Table 1. Respondents' Profile

Profile	Frequency	Percentage
Gender		
Male	117	53.7%
Female	101	46.3%
Age		
Under 17	28	12.8%
17-21	35	16.1%
22-26	39	17.9%
27-31	37	17.0%
31-35	42	19.3%
Over 35	37	17.0%
Occupation		
Unemployed	34	15.6%
Freelancer	40	18.3%
Employee	34	15.6%
University Student	35	16.1%
Student	44	20.2%
Entrepreneur	31	14.2%
Domicile		
West Java	218	100%
1-3 times	76	36.7%
4-6 times	73	34.4%
Over 6 times	62	28.9%

The respondents' age ranged from under 17 to over 35 years old, with the highest representation falling within the 31–35 age group (19.3%), followed closely by the 22–26 age group (17.9%) and those over 35 (17.0%). This suggests that live-streaming appeals to a broad age spectrum, particularly individuals in their early 30s, who may exhibit higher purchasing power and digital consumption behavior.

Regarding occupation, the most significant proportion of respondents were students (20.2%), followed by freelancers (18.3%), university students (16.1%), and employees (15.6%). Notably, unemployed individuals and employees accounted for 15.6%, while entrepreneurs comprised 14.2% of the sample. The presence of diverse occupational groups, especially those with digital exposure, like freelancers and entrepreneurs, reflects the broad reach of live-streaming across different socioeconomic sectors.

All respondents resided in West Java (100%), ensuring a consistent regional scope for analysis. In terms of live streaming usage frequency, the majority of respondents (36.7%) reported engaging in

live-streaming 1–3 times, followed by 4–6 times (34.4%) and more than 6 times (28.9%). These figures imply that most respondents are moderate to highly engaged with live-streaming, making them relevant and insightful participants for examining patterns of digital customer engagement.

Confirmatory Factor Analysis

To assess validity and reliability, the model was tested for convergent validity, discriminant validity, and internal consistency as recommended by (Hair et al. 2020). Outer loadings and AVE exceeded the threshold of 0.70 and 0.50 respectively. [Table 2](#) show most constructs has Cronbach's alpha and CR values above 0.70, with the exception of interactivity. Despite its lower reliability ($\alpha = 0.523$; CR = 0.534), it was retained due to its theoretical importance and acceptable AVE (>0.50). Discriminant validity was confirmed via the Fornell-Larcker criterion (see [Table 3](#)). Thus, the model was deemed valid and reliable for structural analysis (Hair et al. 2020, 2021).

Table 2. Outer Loading and Reliability

Code	Measurement	LF
Live Streaming		
Communication Immediacy (X.1) $\alpha = 0.843$, CR= 0.905, AVE= 0.761		
COM1	Live-streaming shopping allows me to give and receive timely feedback regarding the products	0.876
COM2	Live-streaming shopping allows me to use rich and varied language (varied words expressions or emojis) in my messages	0.857
COM3	Live-streaming shopping allows me to communicate about the product as I would in the store	0.884
Visualization $\alpha = 0.873$, CR= 0.890, AVE= 0.797		
VIS1	Live-streaming shopping provides me with detailed pictures and videos of the products	0.857
VIS2	Live-streaming shopping makes the product attributes visible to me	0.906
VIS3	Live-streaming shopping makes information about how to use products visible to me	0.914
Interactivity $\alpha = 0.523$, CR= 0.534, AVE= 0.676		
INT1	Live-streaming shopping allows me to acquire a wide variety of product features (such as texture, appearance of clothes on different models, different possible clothes combinations, and so on)	0.857
INT2	The experience of live-streaming shopping gives me as much sensory information about the product as I would experience in a store	0.785

Table 3. Continue

Code	Measurement	Loading Factor
Customer Engagement		
Cognitive $\alpha = 0.860$, CR= 0.866, AVE= 0.781		
COG1	I intend to repurchase the product and reuse the same process	0.907
COG2	I am curious about the brand and its new offers	0.880
COG3	I inform others positively about the brand and its digital activities	0.864
Emotional $\alpha = 0.829$, CR= 0.840, AVE= 0.593		
EMO1	I feel an emotional attachment in my first interaction with the brand	0.774
EMO2	My relationship with the brand varies depending on the digital context	0.809
EMO3	I am overall emotionally satisfied with the brand's digital presence	0.832
EMO4	I want to continue interacting with the brand through digital platforms	0.707
EMO5	I feel the desire to communicate directly with the brand	0.722
Behavioral $\alpha = 0.875$, CR= 0.879, AVE= 0.616		
BEH1	I usually proceed to purchase after connecting with the brand digitally	0.814
BEH2	I use available digital channels to participate in the brand's offerings	0.777
BEH3	I am satisfied with my purchase experience	0.828
BEH4	I want to engage more through digital services provided by the brand	0.805
BEH5	I want to participate in any brand offer anytime and anywhere	0.752
BEH6	I act as a community advocate by sharing and promoting brand offers	0.728

* Notes: LF= loading factor; α = Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted

Table 4. Discriminant Validity (Fornell-Larcker)

	BEH	COG	COM	EMO	INT	VIS
BEH	0.785					
COG	0.466	0.884				
COM	0.472	0.687	0.872			
EMO	0.789	0.575	0.523	0.770		
INT	0.666	0.440	0.413	0.660	0.822	
VIS	0.476	0.452	0.558	0.675	0.480	0.893

Structural Model Evaluation

Following the validation of the measurement model, the structural model was assessed as part of the PLS-SEM procedure. This phase involved examining the coefficient of determination (R^2), predictive relevance (Q^2), effect sizes (f^2), model fit indices, and the statistical significance of structural path coefficients (Hair et al. 2020, 2021). As shown in [Table 4](#) [Table 6](#), *F-Square* and illustrated in [Figure 2](#), the R^2 values for the endogenous constructs reflect moderate explanatory power: 0.502 for cognitive engagement, 0.613 for emotional engagement, and 0.499 for behavioral engagement. These

values fall within the range of moderate effect thresholds, suggesting that the proposed independent variables account for approximately half of the variance in the dependent constructs, thus offering a sound basis for interpreting the structural paths (Hair et al. 2020).

Moreover, all path relationships were found to be statistically significant, with T-statistics exceeding 2.0 and p-values below 0.01, thereby supporting all the hypothesized relationships in the model (Hair et al. 2020). To assess predictive accuracy, blindfolding procedures were employed to calculate Q^2 values. As reported in [Table 5](#), all Q^2 values were above zero, confirming

predictive relevance for all dependent constructs, with emotional engagement showing the highest Q^2 (0.354), followed by Cognitive (0.374) and behavioral engagement (0.298), aligning with guidelines for predictive validity in PLS-based models (Hair et al. 2021).

Additionally, effect size analysis using f^2 revealed meaningful contributions of specific predictors. Table 6 show communication immediacy demonstrating a strong effect on cognitive engagement ($f^2 = 0.468$), and emotional engagement having a substantial effect on behavioral engagement ($f^2 = 0.420$), highlighting the practical importance of these relationships.

Model fit was further evaluated using SRMR, d_{ULS} , d_G , and NFI as presented in Table 7. The SRMR values of 0.079 (saturated) and 0.098 (estimated) fell below the commonly accepted threshold of 0.10, indicating a satisfactory global model fit. Discrepancy measures d_{ULS} (1.569–2.416) and d_G (0.581–0.695) also met the recommended cutoffs for small-sample structural models. Although NFI values (0.763 and 0.737) were slightly below the ideal 0.90 threshold, they remain acceptable for exploratory models, particularly those using reflective-formative constructs (Hair et al., 2021).

Lastly, Table 8 show multicollinearity diagnostics using Variance Inflation Factor (VIF) confirmed that all constructs were free from collinearity, as all VIF values were below the critical value of 5.0 (Hair et al., 2021). Collectively, the model demonstrated robust explanatory and predictive validity, supported by statistical significance, effect sizes, model fit indices, and measurement reliability, reinforcing the strength of the hypothesized relationships within the framework of digital customer engagement in live-streaming environments (see Table 9).

Discussion

This study explored how live-streaming influences digital customer engagement, particularly through the lenses of

communication immediacy, interactivity, and visualization. The research examined how these elements drive consumer cognitive, emotional, and behavioral engagement in real-time digital marketing environments. Communication immediacy emerged as a strong predictor across all three engagement dimensions. This finding aligns with Lu & Chen (2021) and Lulu & Zolkepli (2024), who emphasized that synchronous interaction enables real-time feedback and enhances message clarity, encouraging cognitive attention and emotional resonance. Our study supports these findings, showing that when viewers feel acknowledged and can interact instantly, they process information more thoroughly, form emotional bonds, and demonstrate behavioral outcomes such as purchases or active participation.

Interactivity was also shown to significantly influence cognitive, emotional, and behavioral engagement. As suggested by Xin et al. (2024), interactive environments stimulate users' critical thinking and emotional involvement by giving them agency within the live-stream. Our findings corroborate these insights by demonstrating that features like comment sections, real-time reactions, and live Q&A drive viewers to engage more deeply and actively with brand content.

Interestingly, while significantly influencing emotional engagement, visualization did not yield a statistically significant effect on cognitive and behavioral engagement. This result diverges from 'Yen & 'Nasuredin (2024) and Chen & Wu (2023), who noted that vivid product visuals improve understanding and purchase intention. One possible explanation is that while attractive visuals may create emotional appeal, they may not be sufficient to drive decision-making or behavior without the support of interactive and immediate communication. The live-streaming medium may require a holistic sensory and participatory experience to convert engagement into action fully.

Table 4. R² and Adjusted R²

Variables	R ²	Adjusted R ²
BEH	0.499	0.492
COG	0.502	0.495
EMO	0.613	0.607

Table 5. Q-Square

	Q ²
BEH	0.298
COG	0.374
COM	0.000
EMO	0.354
INT	0.000
VIS	0.000

Table 6. F-Square

Variables	BEH	COG	EMO
COM	0.446	0.468	0.027
INT	0.420	0.047	0.326
VIS	0.016	0.002	0.261

Table 7. Model Fit

Indicators	Saturated Model	Estimated Model
SRMR	0.079	0.098
d_ULS	1.569	2.416
d_G	0.581	0.695
Chi-Square	728.735	808.204
NFI	0.763	0.737

Table 5. VIF

VIF		VIF	
Behavioral		Emotional	
BEH1	2.202	EMO1	1.897
BEH2	1.853	EMO2	1.810
BEH3	2.332	EMO3	2.030
BEH4	2.314	EMO4	1.655
BEH5	2.132	EMO5	1.730
BEH6	1.667	Interactivity	
Cognitive		INT1	1.143
COG1	2.465	INT2	1.143
COG2	2.081	Visualization	
COG3	2.108	VIS1	2.147
Communication		VIS2	2.354
Immediacy		VIS3	2.720
COM1	2.157		
COM2	1.811		
COM3	2.172		

Table 6. Hypothesis Testing

Hypothesis	Effect	Path Coefficient	T-statistics	P-values	Decision
H1	COM→COG	0.594	8.698	0.000	Accepted
H2	COM→EMO	0.126	2.037	0.042	Accepted
H3	COM→BEH	0.187	2.658	0.008	Accepted
H4	VIS→COG	0.036	0.501	0.616	Not Accepted
H5	VIS→EMO	0.406	6.441	0.000	Accepted
H6	VIS→BEH	0.115	1.542	0.123	Not Accepted
H7	INT→COG	0.178	2.656	0.008	Accepted
H8	INT→EMO	0.413	7.502	0.000	Accepted
H9	INT→BEH	0.534	8.964	0.000	Accepted

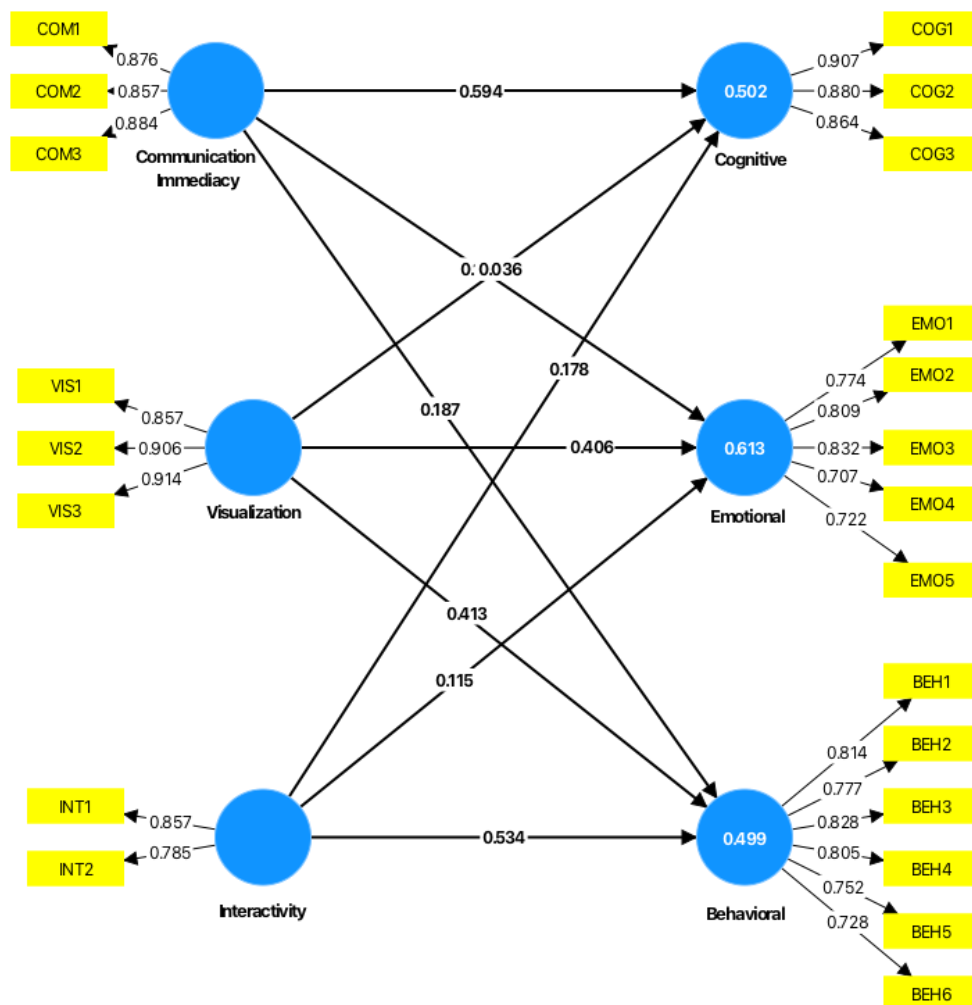


Figure 2. Outer Model & Structural Model

Theoretical Implication

These findings reinforce the theoretical relevance of customer engagement theory, which frames engagement as a multidimensional construct—cognitive, emotional, and behavioural, that is responsive to digital stimuli (Rather & Hollebeek 2021). The empirical evidence confirms that communication immediacy and interactivity significantly contribute to these engagement dimensions, suggesting that real-time responsiveness and reciprocal interaction are critical for activating user cognition, emotion, and behavior in digital spaces. At the same time, this study offers applied theoretical insights through the lens of media richness theory (C. H. Tseng & Wei 2020; F. C. Tseng et al. 2022), which posits that communication channels with higher richness, those that allow immediate feedback, multiple cues,

and personalization, enhance message clarity and engagement. Live-streaming, as a hybrid platform integrating commerce and content, exemplifies a rich media environment that can trigger immersive brand experiences. The results show that while visualization influences emotional resonance, it is the immediacy and interactivity dimensions that strongly determine the depth of engagement. Thus, this research contributes to existing theory by demonstrating how media richness functions as a catalyst that enables the mechanisms of customer engagement to unfold more effectively in live-streaming contexts. It also extends the conceptual boundaries of both theories by highlighting the conditions under which real-time digital affordances convert passive content consumption into participative brand relationships.

CONCLUSION AND RECOMMENDATION

This study examines how live-streaming attributes, i.e., communication immediacy, interactivity, and visualization, shape digital customer engagement across cognitive, emotional, and behavioral dimensions. Revealing through PLS-SEM, the immediacy and the interactivity significantly enhance engagement. Furthermore, visualization primarily fosters emotional connection.

Thereby advancing theoretical understanding of customer engagement and media richness by emphasizing the primacy of real-time two-way interaction. It is over visual cues and offering practical guidance for brands. It is recommended to prioritize responsive, interactive live content strategies.

The limitations of the study are a geographically narrow sample and moderate construct reliability. The recommended future research is to broaden the scope and incorporate variables like trust and fear of missing out (FOMO). These are important for a more nuanced insight into live-stream-driven brand engagement.

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