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Socio-technical systems and trust transfer in live streaming e-commerce: analyzing stickiness and purchase intentions with SEM-fsQCA

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Live streaming has gained substantial significance in the e-commerce realm, attracting the attention of scholars due to its profound impact on the consumer decision-making journey. However, previous studies have not sufficiently investigated into the complex of marketing strategies through trust transfer mechanisms and socio-technical aspects, considering the dynamic nature of the live streaming e-commerce environment. Grounded on the socio-technical system theory, this research develops a research framework that centers on the exploration of interactivity, entertainment, and visualization as catalysts for trust transfer in live streaming. Trust transfer is conceptualized as advancing from cognitive trust to affective trust. Cognitive trust is proposed as a mediating factor bridging socio-technical system constructs to affective trust, ultimately shaping stickiness behavior and purchase intention in the live streaming context. To test the hypotheses, this study collected data from 682 participants in Indonesia and employed a hybrid analysis approach, combining SEM and fsQCA. The SEM results confirm that socio-technical system constructs significantly predict cognitive trust but do not directly impact affective trust. Instead, cognitive trust plays a full mediating role in transforming trust rooted in emotional bonds within the live streaming environment. Furthermore, both cognitive and affective trust exhibit a significant influence on the formation of stickiness behavior and the driving of purchase intention in the domain of live streaming e-commerce. The findings from fsQCA validate diverse configurations that shape stickiness behaviors and purchase intention, enriching marketing and communication strategies within the live streaming context. Additionally, the fsQCA configurations suggest varying conditions for high and low desired outcomes in stickiness and purchase intention, offering a comprehensive understanding of consumer behavior in live streaming e-commerce. This research makes substantial contributions to both theoretical understanding and marketing practice by providing an extensive discussion of configuration combinations that offer enhanced insights into the study's findings.

1 Introduction

The digital transformation in the e-commerce landscape is prominently driven by the rise of live streaming, an innovative phenomenon integrating entertainment, social interaction, and commerce. This fusion is revolutionizing the online consumer experience by offering real-time, interactive sessions that transcend traditional e-commerce boundaries (Chen and Yang, 2023). The global popularity of live streaming is not only changing the dynamics of consumer engagement but is also reshaping contemporary marketing strategies. Its unique feature of synchronous human interaction provides a distinct niche within the realms of the internet and social media, particularly in video transmission (Chen B. et al., 2022; Shih et al., 2023). In the Indonesian market, live streaming within the e-commerce sector has shown exponential growth, securing an 83.4% user base in 2022. Platforms like TikTok have seen significant viewership at 42.2%, while major e-commerce platforms including Shopee, Tokopedia, and Lazada have been instrumental in fostering live shopping experiences (Nurhayati-Wolff, 2022). This trend not only highlights the rapid expansion of the live-streaming commerce market but also underscores the urgent need for businesses to adapt and comprehend consumer behavior in this dynamic digital environment (Shih et al., 2023).

Despite its evident influence and growing popularity, live streaming in e-commerce presents substantial research gaps, particularly in understanding its deeper psychological and behavioral impacts on consumers. Current research primarily focuses on surface-level engagement metrics and transactional data, leaving significant aspects such as consumer trust, brand loyalty, and sustained engagement largely unexplored (Zhang et al., 2022; Ma, 2023). Moreover, there is a notable deficiency in research on how live streaming shapes consumer perceptions, attitudes, and decision-making processes within e-commerce settings (Shih et al., 2023). These gaps in understanding represent critical opportunities for in-depth research in the marketing and consumer behavior fields. Existing literature, often rooted in socio-technical system theory, predominantly addresses transactional behaviors like purchase intentions but has largely neglected the complexities of non-transactional behaviors, such as the concept of "stickiness" (Ma L. et al., 2022; Bao and Zhu, 2023). Furthermore, the critical role of trust transfer mechanisms, especially within the framework of stickiness behavior, remains inadequately examined (Li et al., 2021; Bao and Zhu, 2023). Prior research has laid foundational work employing socio-technical system theory (Zhang et al., 2022; Shih et al., 2023); however, it has not sufficiently addressed the crucial aspect of trust transfer mechanisms, which are pivotal in live streaming. The absence of extensive research on stickiness as a construct and its significant influence on viewer retention in the dynamic live-streaming landscape is particularly evident (Guo et al., 2021).

This study seeks to bridge these gaps by elucidating both transactional and non-transactional behaviors in live streaming e-commerce, focusing on purchase intention and stickiness behavior. Recognizing the considerable time viewers spend on live streaming platforms, this research emphasizes the importance of understanding both behavior types in the e-commerce context.

While previous studies have explored socio-technical aspects and the dynamics of trust transfer, they have primarily focused on the transfer of trust from products to streamers (Zhang et al., 2022; Shih et al., 2023). In contrast, this study diverges to consider the streamer's role as central, postulating that viewers' evaluations of streamers based on cognitive assessments significantly influence affective trust levels (Huang et al., 2022). This approach fills a critical gap in the existing literature by investigating the mechanism through which cognitive trust translates into affective trust, impacting consumer behaviors like purchase intention and stickiness.

Grounded in the socio-technical system theory, this study extends its model to includes a broader spectrum of consumer behaviors in live streaming, including transactional behaviors like purchase intention and non-transactional behaviors like stickiness. By building upon prior research that primarily relied on trust in streamers and products as trust transfer mechanisms (Zhang et al., 2022; Shih et al., 2023), this study introduces cognitive and affective trust as additional mechanisms (Huang et al., 2022). This expansion allows for a more holistic understanding of consumer behavior, focusing on how consumers' cognitive and affective evaluations during live streaming sessions influence their behavioral outcomes (Huang et al., 2022). Furthermore, the study explores the mediating role of cognitive trust on affective trust, thus contributing to the development of a comprehensive model based on previous findings (Zhang et al., 2022; Ma, 2023; Shih et al., 2023). This research also employs a fuzzy sets qualitative comparative analysis (fsQCA) approach to develop configuration solutions for achieving varying degrees of stickiness and purchase intention in live streaming. This methodological innovation addresses the gaps identified in prior studies, providing valuable insights for businesses operating in the live-streaming e-commerce sector and expanding the knowledge domain within the field of live-streaming commerce.

2 Literature review and hypothesis

2.1 Socio-technical system theory

The concept of trust is fundamental in socio-technical system theory, a model that has evolved in response to modern technological advancements. Initially introduced by Cherns (1976), this theory emphasizes the necessity of balancing technical and social elements. It considers human perspectives within the technical domain, while integrating technical expertise into the social realm (Cherns, 1976). Bostrom and Heinen (1977) expanded on this theory, proposing that socio-technical systems strive to simultaneously optimize two distinct subsystems: the social subsystem, which focuses on the individual, group, and institutional dynamics, and the technical subsystem, which revolves around technical skills and knowledge. These scholars further categorized the socio-technical theory into three principal dimensions: human, technological, and task-oriented aspects (Bostrom and Heinen, 1977). The social subsystem prioritizes human attributes such as values, attitudes, competencies, relationships, organizational structures, and reward mechanisms. In contrast, the technical subsystem is concerned with tasks,

technology, and procedural methodologies. Contemporary researchers have applied the socio-technical system theory across various domains, including social media (Shin and Choi, 2015), e-commerce (Zhang et al., 2022), and in exploring the critical role of the integration between technology and social interactions.

The socio-technical system theory has become increasingly important in the study of online consumer behavior, particularly within the context of live streaming e-commerce. Zhang et al. (2022) have emphasized the significance of this theory in unraveling how social and technical factors collectively impact consumer behavior, with a special focus on how live streaming commerce promotes communication and social interactions (Kull et al., 2013). As live streaming gains popularity among consumers, research interests are evolving. Ma X. et al. (2022) point out that while much of the existing research has focused on audience motivation, there is a growing need to investigate other key aspects of the socio-technical theory. These aspects include interactivity, which explores the depth of communication between streamers and consumers (Kang et al., 2021); visualization, concentrating on the benefits of visual data processing (Ma X. et al., 2022); and entertainment, which relates to the streamers' ability to produce engaging content (Kang et al., 2021). This approach highlights a synergy between media practitioners and audiences, leading to a more interactive and engaging consumer experience, and thus deepening an understanding of consumer behavior in a technologically integrated social landscape.

This study proposes a model to analyze consumer purchasing and stickiness behaviors within the live-streaming context, utilizing the socio-technical system theory in the field of social commerce. The research broadens the scope of socio-technical concepts to include live streaming platforms, with a focus on how live streaming augments aspects such as interactivity, visualization, and entertainment. Live streaming provides a dynamic platform where consumers can experience real-time engagement, access in-depth product information, and interact with streamers and other viewers (Wongkitrungrueng and Assarut, 2020; Wongkitrungrueng et al., 2020). This interaction fosters emotional connections and diminishes perceived risks, subsequently enhancing consumer trust. The study acknowledges that a singular focus on social or technical dimensions is insufficient to fully understand consumer behavior in live-streaming commerce. The socio-technical system theory posits that these dimensions are interconnected and must be considered together to comprehensively understand outcomes (Zhang et al., 2022). Therefore, this research aims to integrate both social and technical aspects to provide a holistic view of consumer behavior in live-streaming commerce, enriching our understanding of the dynamics at play in digital commerce.

2.2 Trust transfer

Trust is integral in shaping consumer behavior in online environments, playing a significant role in decision-making processes (Pujiastuti et al., 2017). In live streaming, this manifests as trust transfer, a cognitive process where consumers extend their trust from a known, trusted entity to a less familiar one (Chen W. K.

et al., 2022). Two key mechanisms facilitate this transfer: cognitive-based and affect-based trust (McKnight et al., 1998). Cognitive-based trust is developed through direct interactions with streamers, forming trust based on shared information and experiences (McKnight et al., 2002), while affect-based trust emerges from indirect sources such as word-of-mouth and peripheral cues (Li et al., 2021). This trust transfer, crucial in live streaming, is influenced by perceived interactions and relationships with trusted streamers, where a streamer's trustworthiness can significantly impact the trust placed in featured products (McKnight et al., 1998; Stewart, 2003; Belanche et al., 2014).

Chen B. et al. (2022) expands on this concept by introducing a two-stage model of consumer trust transfer in live streaming commerce, crucially affecting purchase intentions. The first stage involves transferring trust from the streamer to the product, driven by the streamer's credibility and the quality of interaction during the live stream. The second stage translates this product trust into actual purchase intentions. Previous studies emphasize the pivotal role of trust in live streaming commerce, highlighting how both cognitive and affect-based trust transfer mechanisms significantly influence consumer purchasing decisions (Guo et al., 2021; Ma, 2023). This two-pronged approach provides a comprehensive understanding of trust dynamics in live streaming environments, underscoring the critical interplay of cognitive and affective elements in shaping online consumer behavior.

2.3 Socio-technical constructs and trust

Interactivity within live streaming significantly shapes viewers' trust perceptions. This element, defined by the real-time interaction between streamers and viewers, provides streamers with an exceptional platform to establish trust through transparency and credibility. This assertion aligns with findings from Cao et al. (2018), who emphasize the importance of streamer-viewer engagement. Active engagement, including prompt responses to viewer inquiries, detailed information provision, and live product or service demonstrations, enhances viewers' perceptions of content reliability and trustworthiness. Prior research in online environments, particularly in online payment systems and e-commerce platforms, has investigated the determinants of cognitive trust. Key contributors identified in these studies include information transparency, reliability, and credibility. Drawing on these insights, this study suggests that interactivity, being a fundamental feature of live streaming, plays a critical role in building cognitive trust. It achieves this by diminishing information asymmetry and reinforcing perceptions of reliability and transparency. Based on these considerations, the study formulates the following hypothesis.

H1a. Interactivity significantly influences cognitive trust in the context of live streaming e-commerce.

This study is predicated on the idea that interactivity in live streaming is crucial in cultivating consumers' affective trust. Affective trust, marked by emotional connections and positive sentiments toward streamers or platforms, typically stems from interpersonal interactions. This concept is supported by Tian et al. (2023), who highlight the significance of interactivity in

building deep connections and engagement between streamers and their audience. When viewers are actively engaged in the live streaming process—through prompt responses to their queries, personalized interactions, or real-time discussions—they tend to develop stronger emotional connections and favorable sentiments toward the streamer (Li et al., 2021). These emotional bonds are key contributors to the development of affective trust. Previous research in the realms of e-commerce and social media has consistently emphasized the importance of interpersonal interactions and emotional engagement as fundamental drivers of affective trust (Kim and Kim, 2021; Kwon et al., 2021). Building on these insights, this study suggests that in the unique environment of live streaming, interactivity plays an instrumental role in enhancing affective trust. It does so by nurturing emotional ties and promoting positive sentiments among viewers. In light of this understanding, the study proposes the following hypothesis.

H2a. Interactivity significantly influences affective trust in the context of live streaming e-commerce.

Visualization emerges as a key factor in shaping cognitive trust, which is a focal point of this research. Cognitive trust here refers to consumers' beliefs regarding the reliability, accuracy, and authenticity of information presented in live-streaming sessions. Visualization, on the other hand, involves the streamers' ability to present products and services visually in real time, providing an in-depth and engaging view of the items on offer (Xue et al., 2020). This visual representation effectively bridges the gap between digital and physical shopping experiences, allowing consumers to gain a more tangible understanding of the products under consideration (Wongkitrungrueng and Assarut, 2020). The impact of visualization on cognitive trust is of paramount interest in this study. Detailed visual demonstrations of products or services heighten the content's perceived credibility and trustworthiness (Huang et al., 2022). By mitigating information asymmetry and reducing uncertainty, these visual presentations enable consumers to visually assess and evaluate products, thereby boosting their cognitive trust in the information provided. Prior research in the broader e-commerce sector has underscored the importance of visual information in fostering consumer trust (Liu and Arnett, 2000). Visual elements like images and videos have been consistently found to positively influence trust in online shopping environments. In the specific context of live-streaming e-commerce, where real-time visual interaction is a defining characteristic, this study hypothesizes that enhanced visualization during live-streaming sessions significantly bolsters cognitive trust. It is posited that consumers exposed to a rich visual experience in live streams are likely to demonstrate increased cognitive trust, attributed to the improved perception of content reliability and trustworthiness. Based on these insights, the study advances the following hypothesis:

H1b. Visualization significantly influences cognitive trust in the context of live streaming e-commerce.

Affective trust, which is rooted in emotional connections and positive viewer sentiments, often arises from real-time interactions between viewers and streamers in the live streaming context (Lim et al., 2020). Viewers' active engagement with streamers through questions, personalized responses, and interactive discussions is instrumental in fostering these emotional ties and positive

sentiments (Kim and Peterson, 2017). Prior research in the fields of e-commerce and social media has highlighted the importance of such emotional engagement in the development of affective trust (Lee and Kwon, 2011). Building on this foundation, this study argues that in the context of live streaming, enhanced visualization significantly contributes to affective trust by reinforcing emotional connections and fostering positive sentiments among viewers. The visual aspects of live streaming, such as product demonstrations and visual interactions with streamers, are key in shaping the viewers' emotional experiences. The study posits that viewers who encounter more comprehensive and engaging visual content during live streams are likely to experience a stronger development of affective trust. This increase in trust is attributed to the heightened emotional engagement that effective visualization facilitates. Essentially, the research emphasizes the critical role of visualization in influencing the dynamics of affective trust within the vibrant setting of live streaming e-commerce. Based on these insights, the study proposes the following hypothesis:

H2b. Visualization significantly influences affective trust in the context of live streaming e-commerce.

Entertainment in live streaming, defined by the level of enjoyment and engagement it provides, fulfills various consumer needs such as recreation, aesthetic enjoyment, and emotional release (Wongkitrungrueng and Assarut, 2020). In this environment, consumers engage with streamers who skillfully present products, transforming the experience into a virtual fashion showcase. Streamers often enhance this engagement by incorporating elements like prize draws, cash voucher giveaways, and flash sales, adding to the consumer's perceived value of participating (Xue et al., 2020). When consumers engage in these activities, especially if they gain tangible rewards, they perceive a heightened sense of value in their interaction. This engagement not only appeals to viewers' rational cognitive processes but also influences their emotional responses, thereby impacting their online shopping behavior (Wongkitrungrueng and Assarut, 2020). Previous studies have highlighted the significant role of entertainment in developing consumer trust and brand trust in live streaming (Lee and Kwon, 2011; Zhang et al., 2022). Acknowledging this, the current study seeks to examine how entertainment, as a crucial component of the socio-technical construct, plays a role in the process of trust transfer. This involves exploring the intricate relationship between entertainment and cognitive trust in the context of live streaming e-commerce. The study posits that the entertainment aspect of live streaming significantly influences viewers' trust, both cognitively and emotionally, due to the immersive and engaging nature of the medium. Consequently, the following hypothesis is formulated:

H1c. Entertainment significantly influences cognitive trust in the context of live streaming e-commerce.

H2c. Entertainment significantly influences affective trust in the context of live streaming e-commerce.

Integrating entertainment elements into live streaming interactivity, such as giveaways or engaging product demonstrations, significantly strengthens the connection, and interaction between streamers and viewers (Kim et al., 2008; Liu et al., 2018). These entertaining features not only motivate viewers to participate actively but also enhance their enjoyment,

fostering emotional attachments and positive sentiments toward both the streamer and the platform (Li et al., 2021). Prior research in e-commerce and social media has consistently underscored the importance of interpersonal interactions and emotional engagement as key factors in building affective trust (Lee and Kwon, 2011; Kim and Peterson, 2017). This study extends this understanding to live streaming, suggesting that incorporating entertainment elements markedly boosts affective trust. It does so by nurturing emotional connections and encouraging positive feelings among viewers. The inclusion of these entertaining components in live streaming presents a distinct opportunity to develop affective trust, making the viewer experience more immersive and emotionally resonant. In light of these considerations, the study proposes the following hypothesis:

2.4 Trust transfer mechanism

This research aims to develop a model that examines the impact of trust transfer mechanisms on consumer behavior in live streaming, integrating both cognitive and affective trust approaches (Liang et al., 2019). Drawing on the foundational work of Stewart (2003), it applies trust transfer theory within the socio-technical system of live-streaming e-commerce. The study expands to assess consumer trust in products and streamers, as extensively investigated by Wongkitrungrueng and Assarut (2020), emphasizing the process of value transformation (Dessart et al., 2015) and the influence of various entities involved. This approach provides deeper insights into the dynamics of trust in live-streaming commerce, an essential aspect of modern digital consumer engagement.

Cognitive trust is established through responsive and transparent interactions with streamers (Yang et al., 2015; Cao et al., 2018), setting the stage for the development of affective trust. Affective trust, marked by emotional connections and positive sentiments, evolves through extended, significant interactions between consumers and streamers (Lee and Kwon, 2011; Kim and Peterson, 2017; Gong et al., 2020). The study also aims to explore the interaction between these dimensions of trust and their influence on consumer purchasing decisions, especially in the unique setting of live streaming, where personal connection and authenticity are crucial for consumer engagement. By analyzing these trust mechanisms in depth, the research seeks to offer valuable insights into enhancing consumer trust and engagement in the dynamic field of live-streaming commerce. Therefore, the following hypothesis is proposed:

H3. Cognitive trust will significantly transfer to affective trust.

## 2.5 Stickiness behavior and purchase intention

This study distinguishes between two key behaviors in live streaming commerce: "stickiness behavior" and "purchase

intention." Stickiness behavior refers to the repetition of actions when engaging with live-streaming content and is crucial for viewer retention and purchases through social networks (Hsu and Liao, 2014). In contrast, purchase intention is the inclination to acquire a specific product or brand (Hsu and Liao, 2014). Scholars have explored the influence of live streaming attributes on consumer behavior (Spears and Singh, 2004; Sun et al., 2019; Wongkitrungrueng and Assarut, 2020). Consumer stickiness reflects the streamer's ability to engage the audience (Li et al., 2021), especially in the context of media personalities (Hu and Chaudhry, 2020). Live streaming is known for sharing information through social media, enhancing stickiness when viewers feel a connection or derive satisfaction from media personalities (Chiang and Hsiao, 2015). This research presents a model examining how stickiness in live streaming affects purchase intention. Live streaming has boosted consumer confidence in online shopping (Sun et al., 2019). Previous studies confirm the impact of stickiness on purchase intention (Hsu and Lin, 2016). Consumer purchase intentions are influenced by attitudes, enjoyment, social influence, adaptability, and perceived ease (Bleize and Antheunis, 2019; Singhal et al., 2019). Streamers who prioritize customer needs capture and maintain customer interest (Yim et al., 2017). This study investigates how consumers evaluate product information from streamers in product reviews and its impact on stickiness. Viewer behavior significantly affects the user experience, with factors like attachment and user addiction contributing to stickiness behaviors (Li et al., 2021). Cognitive trust, based on streamer credibility, reliability, and professionalism, influences stickiness behaviors (Lewis and Weigert, 1985; McAllister, 1995). Cognitive trust leads to viewers interpreting streamer review information as reliable, encouraging prolonged viewing and active participation. Affective trust, based on emotional bonds, is the foundation of trust in live streaming (Huang et al., 2022). When streamers cultivate both cognitive and affective trust, viewers stay longer and actively engage in activities.

H4a, b. Cognitive and affective trust significantly influences stickiness behaviors.

Cognitive trust plays a significant role in shaping consumer behavior within the realm of live streaming e-commerce. This form of trust, rooted in rational assessments of credibility, reliability, and professionalism (Lewis and Weigert, 1985; McAllister, 1995), leads consumers to depend on streamers' content when making purchase decisions. As trust in streamers grows, the likelihood of forming purchase intentions also increases. This relationship between cognitive trust and purchase intentions is supported by prior studies (e.g., Hong and Cha, 2013; Mainardes and Cardoso, 2019). Therefore, this study posits that cognitive trust becomes a robust predictor that influences viewers' purchase intentions during live streaming e-commerce sessions. On the other hand, affective trust pertains to consumers' willingness to purchase a product featured in live streaming due to the emotional bond they have developed with the streamer (Huang et al., 2022). Hence, this research posits the following hypothesis:

H5a, b. Cognitive and affective trust significantly influences purchase intention.

FIGURE 1
Conceptual framework.
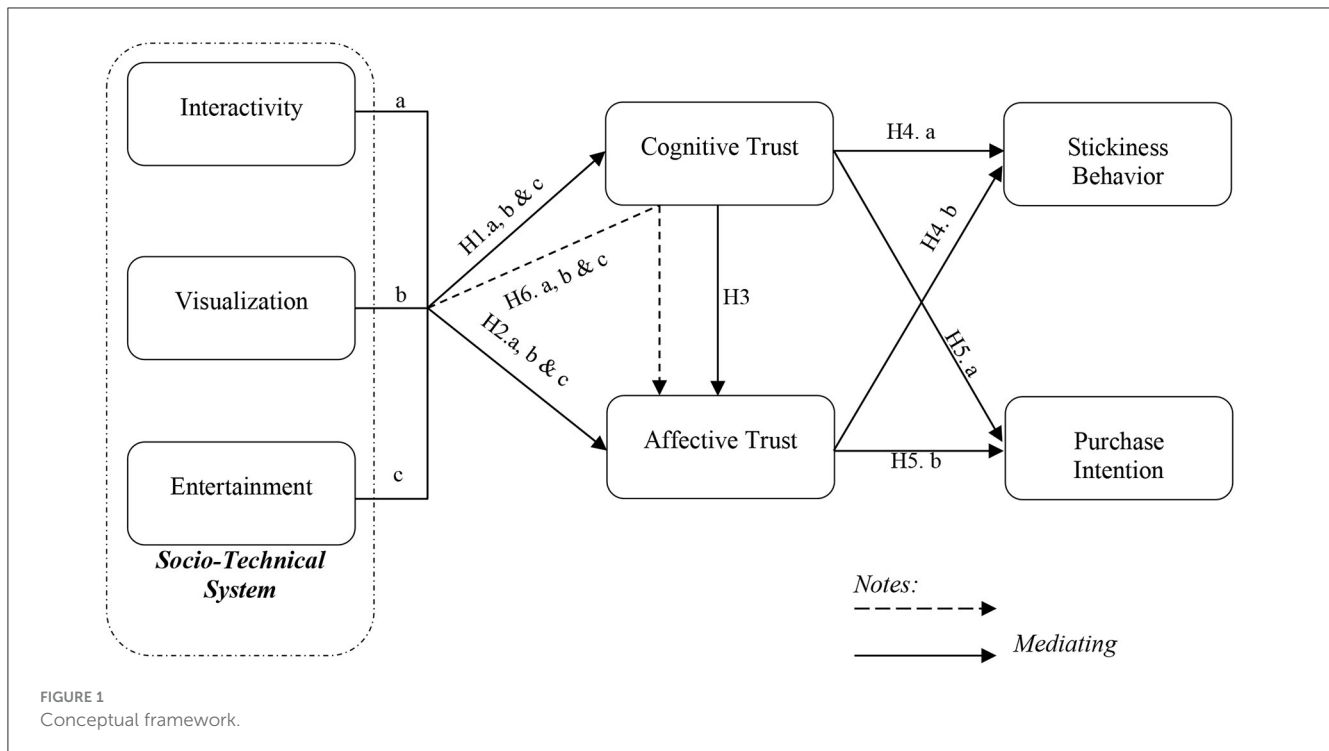
2.6 Mediating effect of cognitive trust

In the dynamic environment of live-streaming e-commerce, a critical area of inquiry revolves around the mediating role of cognitive trust in outlining the interrelationships among salient factors. These factors including interactivity, visualization, and entertainment on one facet and affective trust on the other. Cognitive trust is rooted in the rational evaluation of credibility, reliability, and professionalism (Lewis and Weigert, 1985; McAllister, 1995), emerges as a pivotal determinant significantly influencing consumers' perceptions of trustworthiness within this context. Notably, as consumers come to perceive streamers as reliable and dependable sources of information, primarily due to the heightened levels of interactivity, vivid visualization, and captivating entertainment intrinsic to the live streaming experience (Zhang et al., 2022), cognitive trust commences its development. This establishment of cognitive trust is paramount as it instills a profound sense of reliance among consumers, leading them to trust the information disseminated during live streams, thus solidifying its fundamental role (Hong and Cha, 2013).

Throughout this process, consumers attribute increased credibility and value to the information proffered by streamers, further augmenting cognitive trust levels. Moreover, the facet of interactivity, characterized by real-time engagement and responsiveness, catalyzes deep-seated emotional connections and nurtures positive sentiments toward both the streamers and the platforms (Lee and Kwon, 2011; Kim and Peterson, 2017). This facet forms the cornerstone for the subsequent development of affective trust. Concurrently, vivid visualization and engaging entertainment content within live streaming sessions effectively captivate viewers' attention and emotions, reinforcing their

emotional bonds with the streamers (Mainardes and Cardoso, 2019). This, in turn, significantly contributes to the augmentation of affective trust. Therefore, it is evident that the intricate interplay among these multifaceted factors collectively shapes viewers' affective trust in this dynamic landscape. Thus, this study posits the following hypothesis and all the summarized hypothesis displayed in Figure 1.

H6. Cognitive trust significantly mediates the relationships between (a) interactivity, (b) visualization, (c) entertainment, to affective trust.

2.7 Proposition development

The primary objective of this research is to combine trust transfer mechanisms, stickiness behavior, and purchase intention within the framework of socio-technical system theory. Previous studies have successfully identified hypotheses establishing causal relationships between socio-technical system theory constructs and trust (Zhang et al., 2022), stickiness behavior (Huang et al., 2022), and purchase intention (Liu et al., 2018). However, empirical evidence has demonstrated that in the complex environment of live streaming e-commerce, these causal relationships, based on symmetrical relationships, are not feasible. Therefore, these findings are considered strong in theoretical terms but have limited practical implications.

In this study, employing an fsQCA analysis approach, we aim to identify asymmetric relationships to predict consumer behavior in the live streaming e-commerce environment based on socio-technical system theory constructs and trust transfer mechanisms. Consequently, this research will test the impact of factors such as

FIGURE 2
Asymmetrical framework to predict high vs. low stickiness and purchase intention from socio-technical system constructs and trust.
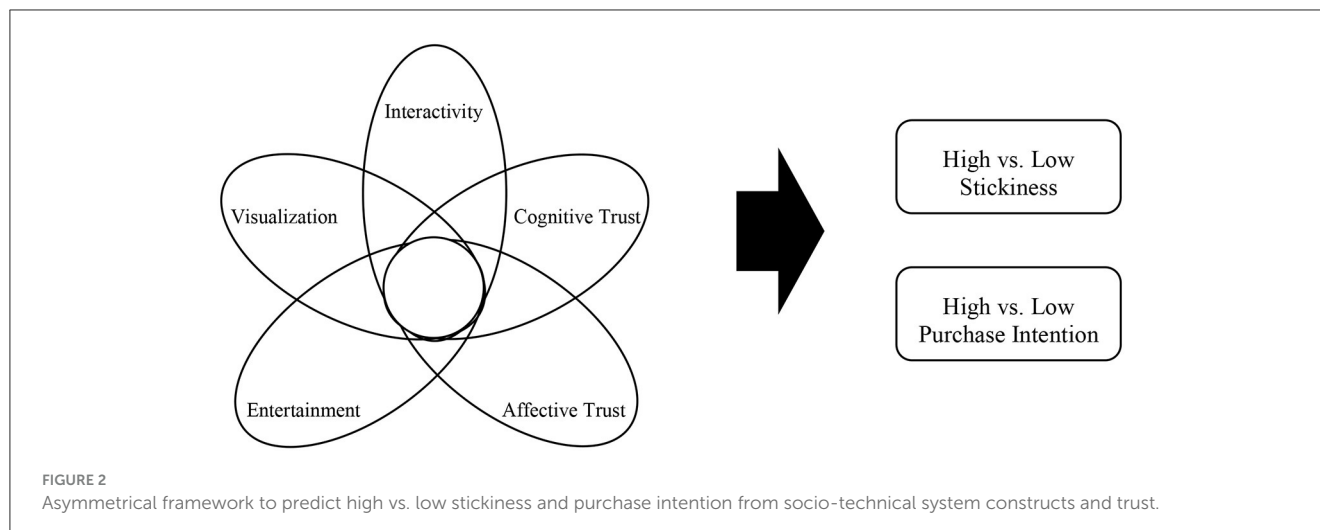
interactivity, visualization, and entertainment when combined with cognitive and affective trust to predict conditions that may lead to favorable consumer behaviors, specifically purchase intention and stickiness behavior. Simultaneously, this research will identify factors that have an unfavorable impact on consumer behavior in the context of live streaming commerce. This will be beneficial for designing marketing strategies, where managers can benefit from configurations that either favor or disfavor consumer behavior in live streaming.

To the best of our knowledge, this research is the first to propose propositions regarding stickiness behavior and purchase intention based on socio-technical system constructs combined with cognitive and affective trust. Although the method of proposing propositions has been employed previously (see Hutahaean et al., 2023; Ma, 2023), it has not been used in the investigation of consumer behavior in live streaming based on socio-technical system factors and trust. This research will contribute to advancing the current body of knowledge and broadening the perspectives of marketing managers in designing their live streaming channels. Therefore, this study puts forth the following propositions to be tested and displayed in Figure 2:

Preposition 1a-b: The presence of single constructs of socio-technical systems and trust alone is insufficient to achieve high stickiness behavior and purchase intention in live streaming.

Preposition 2a-b: The absence of single constructs of socio-technical systems and trust alone is insufficient to cause a low level of stickiness behavior and purchase intention in live streaming.

3 Methods

3.1 Operationalization

This study operationalizes each variable used in the research to justify how the variables are defined and measured. Table 1 displays the operationalization of research variables.

3.2 Sampling technique and data collection

This study focuses on Indonesian live streaming commerce users to investigate stickiness behavior and purchase intentions on the platforms. Participants were selected using purposive sampling based on specific criteria: (1) having participated on live streaming e-commerce platforms (e.g., Shoppe., Tokopedia, Lazada, etc.), and (2) have experienced in purchasing products during live streaming sessions. This ensured authentic and relevant participant experiences. Data collection was conducted via an online survey using Google Forms. An online survey link was distributed randomly across various social media platforms (Facebook, Instagram, WhatsApp, TikTok, etc.) over 5 months from March to August 2023, resulting in 682 valid responses. Respondents provided demographic information and completed questionnaires for each construct in the study in Table 2.

3.3 Analysis technique

This study employs a dual-analytical approach to examine consumer behavior outcomes, specifically focusing on purchase intention and stickiness behavior. By integrating SEM and fsQCA, the research aims to provide a comprehensive analysis that covers both linear and configurational relationships.

The first methodological approach involves SEM, conducted using Smart-PLS 4.0 software. SEM is instrumental in assessing relationships between variables, particularly in terms of direct, mediating, and moderating effects. The process begins with ensuring validity and reliability of the model through tests for convergent validity (Hair et al., 2017), which examines the alignment of different indicators of a construct, internal consistency measured by Cronbach's alpha (Hutahaean et al., 2023), and discriminant validity (Fornell and Larcker, 1981; Henseler et al., 2015) to confirm the distinctness of constructs. SEM also evaluates the model's explanatory power using the R-square criterion (Falk

TABLE 1 Operationalization.

Constructs	Definition	Measurement items	OL	CA	CR	AVE
Interactivity	Source: Kang et al. (2021)	Source: Modified from Ma X. et al. (2022)				
	Interactivity is defined as interaction that refers to the intensity and richness of the interactions that occur in the two-way communication between streamers and consumers.	Streamers greatly enjoy engaging in communication with their audience.	0.850	0.898	0.929	0.766
		Streamers actively respond to viewers' questions.	0.889			
		Streamers promptly address viewers' questions and requests.	0.867			
		Streamers provide relevant information in response to viewers' inquiries.	0.894			
Visualization	Source: Ma X. et al. (2022)	Source: Modified from Ma X. et al. (2022)				
	Visualization is one of the most significant ways through which humans acquire information, and visual information processing offers distinct advantages in terms of high speed, large capacity, and parallelism	Live streaming makes information about how to assemble the product visible to me.	0.923	0.904	0.940	0.839
		Live streaming makes product attributes visible to me.	0.920			
		Live streaming helps me visualize the product as if it were in the real world.	0.904			
Entertainment	Source: Wongkitrungrueng and Assarut (2020)	Source: Ma X. et al. (2022)				
	Entertainment is the extent to which an enjoyable and engaging experience is created by the streamer.	The live stream is engaging.	0.875	0.884	0.928	0.811
		The live stream helps me relax.	0.911			
		The live stream brings me joy.	0.916			
Cognitive trust	Source: McAllister (1995)	Source: Huang et al. (2022)				
	Cognitive trust is a form of evaluating information based on an individual's judgment of reliability and professionalism.	Considering the track record of the streamers, I have no reason to doubt their competence.	0.871	0.938	0.953	0.801
		I know that the information provided to me is based on the streamers' best judgment.	0.855			
		I trust the streamers because they appear to be reliable.	0.927			
		I can rely on the advice of the streamers because they are sincere.	0.910			
		I confidently depend on the streamers because they make my decisions easier.	0.911			
Affective trust	Source: McAllister (1995)	Source: Huang et al. (2022)				
	Affective trust is a form of evaluation that refers to an individual's emotional connection or bond when exchanging information.	Streamers provide assistance and support.	0.912	0.959	0.968	0.858
		Streamers consider my wellbeing when giving advice.	0.916			
		I trust streamers to consider my interests in future purchases.	0.936			
		I trust streamers because they care.	0.932			
		I rely on streamers for important matters.	0.935			

TABLE 1 (Continued)

Constructs	Definition	Measurement items	OL	CA	CR	AVE
Stickiness behavior	Source: Li et al. (2021)	Source: Huang et al. (2022)				
	"Stickiness" refers to creating a lasting impression and actively engaging users, playing a pivotal role in determining user retention and purchases through social networks.	I will stay for a long time while watching the streamer's streaming channel.	0.939	0.946	0.966	0.903
		I usually spend a lot of time watching the streamer's streaming channel.	0.960			
		I intend to extend my stay on this streamer's streaming channel.	0.952			
Purchase intention	Source: Ha et al. (2014)	Source: Chen W. K. et al. (2022)				
	Purchase intention is the level of awareness that indicates an intention or likelihood to purchase a product or service being offered.	I will consider live streaming shopping as my first choice for shopping.	0.916	0.936	0.959	0.997
		I intend to purchase products or services through live streaming.	0.960			
		I hope I will purchase products or services through live streaming.	0.948			

The threshold for OL, Outer Loadings ≥ 0.70; CA, Cronbach's Alpha ≥ 0.70; CR, Composite Reliability ≥ 0.70; AVE, Average Variance Extracted ≥ 0.50.

and Miller, 1992) and is crucial for testing hypotheses related to direct effects and mediation.

The second approach, fsQCA, utilizes version 4.1 software developed by Ragin (2023). This method is geared toward identifying various configurations of conditions that influence the outcomes of purchase intention and stickiness behavior. FsQCA allows for the exploration of how different combinations of factors contribute to these outcomes. The process includes calibration selection (Pappas and Woodside, 2021) for creating a truth table, which is then used to predict potential outcomes (Pappas and Woodside, 2021). This approach is especially beneficial for revealing complex interaction patterns and understanding how various conditions collectively impact the desired outcomes.

By combining SEM and fsQCA, the study bridges linear cause-effect analyses with the complexity of condition-based outcomes. SEM provides insights into the direct and indirect effects on purchase intention and stickiness behavior, while fsQCA uncovers the combinations of conditions that lead to these outcomes. This methodological synergy enhances the depth and robustness of the research, offering a multifaceted understanding of the factors influencing consumer purchase intention and stickiness behavior in a complex and dynamic environment.

4 Results

4.1 Common method variance

Before examining data analysis outcomes, this research evaluated Common Method Variance (CMV). Harman's single factor analysis was employed for this purpose, aiming to determine the uniformity in participants' responses to all study items (Baumgartner et al., 2021). This analysis involved assessing the loading of all items onto a single factor. The result, which was

26.2%, suggests that common method variance is not a significant issue, as it falls below the 50% threshold (Baumgartner et al., 2021).

4.2 Validity and reliability assessment

The evaluation of validity and reliability in this research commenced by examining convergent validity. The outcomes of the convergent validity assessment demonstrated that all outer loadings exceeded the prescribed threshold of 0.70 (Hair et al., 2017). Moreover, the values of both Cronbach's alpha (CA) and composite reliability exceeded 0.70, affirming the presence of internal consistency and strong validity in the data (Hair et al., 2017). Furthermore, the AVE values exceeded 0.50, confirming that convergent validity is not a source of concern within the dataset (Hair et al., 2017). These findings are summarized in Table 1.

Subsequent to the examination of validity and reliability, the research model endured a scrutiny of discriminant validity through three distinct approaches, all of which collectively affirm the absence of discriminant validity issues. To begin, the Fornell–Larcker criterion, as displayed in Table 3, reveals that the square root of the AVE values (diagonal bolded values) surpasses the remaining values, thus confirming robust discriminant validity (Fornell and Larcker, 1981). Furthermore, the outcomes of the discriminant validity assessment using the heterotrait-monotrait ratio (HTMT) method are exhibited in Table 3 (the values in parentheses). These results illustrate that all values fall below the designated threshold of <0.85, signifying that the dataset utilized for testing the research model indeed upholds strong discriminant validity (Henseler et al., 2015). As an additional step, the study employed a cross-loadings matrix to scrutinize discriminant validity. This approach evaluates the strength of items belonging to one construct in comparison to items from other constructs within the model (Hair et al., 2017). The findings, as presented in

TABLE 2 Sample profile.

Measures	Category	Frequency	Percentage (%)
Gender	Male	281	41.2
	Female	401	58.8
Age (years old)	<20	141	20.7
	21–30	523	76.7
	31–40	15	2.2
	41–50	0	0
	>50	3	0.4
Marital status	Married	45	6.6
	Single	637	93.4
Occupation	University student	481	70.5
	Entrepreneurs	29	4.3
	Self-employment	86	12.6
	Government employee	22	3.2
	Military	44	6.5
	Housewife	20	2.9
Frequency of watching live streaming in 1 day	1–3 times	488	71.6
	4–6 times	66	9.7
	7–9 times	25	36.4
	10–12 times	103	16.9
Purchase experience in live streaming (in a month)	<2 times	481	70.5
	3–5 times	153	22.4
	6–8 times	24	3.5
	9–11 times	24	3.5

Table 4, distinctly indicate that the item values associated with each construct are notably higher than the values corresponding to items not associated with that construct, thus further substantiating the absence of discriminant validity concerns.

4.3 Findings from SEM

The Smart-PLS 4.0 software was employed to perform the structural model analysis, assessing the research model's capacity to scrutinize the proposed hypotheses (Hair et al., 2017). The evaluation of the structural model includes several key steps. Firstly, the R-squared (R^2) values of the endogenous constructs are calculated. Notably, Falk and Miller (1992) emphasize that a structural model is considered satisfactory when the R^2 value surpasses 0.1 or nears 1. In our analysis, the R^2 values for cognitive and affective constructs are computed to be 0.523 and 0.603,

respectively. These values are accounted for by the path coefficients relating to interactivity, entertainment, and visualization. Similarly, the R^2 values for the stickiness behavior and purchase intention constructs are found to be 0.513 and 0.470, respectively. These are associated with the path coefficients of cognitive trust and affective trust. The R^2 values for the endogenous constructs in the research model are all found to exceed the threshold of 0.1, signifying their adequacy for this study. Secondly, the model's fit is examined. Our results indicate that each model satisfies the designated criteria, including SRMR = 0.037, d_ULS = 0.493, d_G = 0.421, and NFI = 0.903, all of which align with the prescribed standards and recommendations (Hair et al., 2017).

As indicated in Table 5, hypothesis testing reveals that the socio-technical system constructs such as interactivity ($\beta = 0.288$, $t = 6.090$), entertainment ($\beta = 0.415$, $t = 9.802$), and visualization ($\beta = 0.288$, $t = 6.090$) have a significant impact on cognitive trust, thus supporting hypotheses H1a to H1c. However, they do not exert a significant influence on affective trust, as detailed by the values of interactivity ($\beta = 0.026$, $t = 6.090$), entertainment ($\beta = 0.006$, $t = 0.116$), and visualization ($\beta = 0.091$, $t = 1.383$). Consequently, hypotheses H2a to H2c are rejected. On the other hand, trust transfer mechanisms are illustrated by how cognitive trust is converted into affective trust. In this regard, cognitive trust is considered a construct that can support the proposed trust transfer mechanism, given its influence on affective trust ($\beta = 0.639$, $t = 9.767$). Predictors for stickiness behavior and purchase intention are determined based on cognitive and affective trust. Hypothesis testing results indicate that cognitive ($\beta = 0.318$, $t = 6.537$) and affective trust ($\beta = 0.452$, $t = 9.211$) can significantly influence consumer stickiness behavior in live streaming e-commerce, thus supporting H4a to H4b. Furthermore, cognitive ($\beta = 0.317$, $t = 5.750$) and affective trust ($\beta = 0.421$, $t = 7.212$) also demonstrate the potential to drive consumer purchase intentions during live-streaming e-commerce, thus corroborating hypotheses H5a to H5b.

The investigation in this study included the evaluation of the hypothesis regarding cognitive trust's mediating capacity in the association between socio-technical system constructs and affective trust. The primary objective was to acquire insights into the extent of cognitive trust's involvement, developed over the course of the live streaming experience, in significantly shaping affective trust, which is essentially rooted in emotional connections. The outcomes of this hypothesis testing indicate that cognitive trust indeed serves as a full mediator in the relationship between interactivity ($\beta = 0.184$, $t = 5.671$), entertainment ($\beta = 0.265$, $t = 6.293$), and visualization ($\beta = 0.119$, $t = 3.445$), and affective trust. Hence, this lends support to hypotheses H6a, b, and c (Table 6).

4.4 fsQCA analysis

4.4.1 Calibration selection and truth table

The fsQCA analysis was initiated through calibration selection, a key step in constructing a truth table. The structure of this truth table functions to outline the in-built logic associated with every possible probability combination of the observed independent constructs concerning the outcomes of high and low stickiness behavior and purchase intention. In this study, the constructs were

TABLE 3 Discriminant validity.

	AT	CT	ENT	INT	PI	STK	VSL
Affective trust (AT)	**0.926**						
Cognitive trust (CT)	0.719 (0.756)	**0.895**					
Entertainment (ENT)	0.528 (0.572)	0.704 (0.774)	**0.901**				
Interactivity (INT)	0.515 (0.550)	0.663 (0.722)	0.601 (0.674)	**0.875**			
Purchase intention (PI)	0.649 (0.685)	0.620 (0.660)	0.510 (0.561)	0.476 (0.514)	**0.942**		
Stickiness behavior (STK)	0.681 (0.715)	0.644 (0.681)	0.540 (0.590)	0.472 (0.509)	0.722 (0.768)	**0.950**	
Visualization (VSL)	0.520 (0.557)	0.637 (0.693)	0.618 (0.691)	0.671 (0.742)	0.482 (0.522)	0.447 (0.483)	**0.916**

The numbers in parentheses represent the Heterotrait-Monotrait Ratio with a threshold of <0.85, indicating strong discriminant validity. The bold numbers are the square root of the AVE.

measured using a 7-Likert scale. The calibration selection approach, as recommended by Pappas and Woodside (2021), was adopted to synchronize the scale calibration with this measurement. This approach categorized the scale into three distinct group sets, designating "6" as indicative of full membership, "2" as symbolic of full non-membership, and "4" representing the point of intersection. Following this calibration process, the data was transformed into fuzzy sets, exhibiting a scale that ranges from "0" to "1." Subsequent to this calibration and transformation, a truth table analysis was executed to convert the data into a fuzzy logic format. In this format, data is denoted as "0," signifying "No," and "1," signifying "Yes." The comprehensive results of the truth table analysis can be observed in Tables 7, 8.

Table 7 reveals 14 distinct configuration combinations of socio-technical system constructs and trust that contribute to the emergence of high stickiness behavior and purchase intention. Upon closer examination, it becomes evident that each configuration corresponding to the outcome of high stickiness behavior and purchase intention is unique and distinctive. Consequently, the truth table constructed as the foundation for data analysis is proficient in predicting varying outcomes. Simultaneously, in Table 8, pertaining to the outcome of low stickiness behavior and purchase intention, there are 15 distinct outcomes for low stickiness behavior and 14 for low purchase intention. Under analogous conditions, every configuration established within the truth table is unique and dissimilar. This peculiarity renders it suitable for conducting data analysis to achieve a comprehensive set of results.

4.4.2 fsQCA findings

Utilizing the fsQCA 4.1 software, configurational analysis was conducted to generate configuration findings that predict both high and low stickiness behavior and purchase intention. Table 9 presents the outcomes of the fsQCA analysis, revealing the presence of three configurations that effectively predict high stickiness behavior, with an overall consistency of 0.850 and a coverage solution of 0.976. Additionally, two other configurations predict low stickiness behavior, exhibiting an overall consistency of 0.769 and a coverage solution of 0.572. These results signify the existence of multiple solutions for predicting both high and low stickiness behavior. Importantly, these solutions are distinguished by their consistencies and coverage solutions, which

exceed the 0.70 threshold. Consequently, propositions 1a and 2a are validated. Simultaneously, provides the results of the fsQCA analysis concerning the outcome of high purchase intention. These configurations exhibit an overall consistency of 0.897 and an overall coverage solution of 0.971. Similarly, two other configurations predict low purchase intention, demonstrating an overall consistency of 0.744 and a coverage solution of 0.612. These outcomes also signify the existence of multiple solutions for predicting both high and low purchase intention, characterized by consistencies and coverage solutions surpassing the 0.70 threshold. Consequently, propositions 1b and 2b are affirmed.

Examining each configuration allows for a comprehensive understanding of the effective combinations among three conditions, namely presence, absence, and do not care. Predicting high stickiness behavior involves three distinct configurations. Configuration s1 indicates that high stickiness behavior is attributed to the presence of interactivity and entertainment, while other constructs are considered do not care conditions, yielding a consistency of 87.7%. Configuration s2 points to high stickiness behavior with the presence conditions of visualization and affective trust, combined with the do not care conditions of interactivity, entertainment, and cognitive trust, resulting in a solution consistency of 90.3%. The third solution for high stickiness behavior, configuration s3, combines the presence condition of visualization and the absence conditions of entertainment, cognitive trust, and affective trust, along with the do not care conditions of interactivity, resulting in a solution consistency of 85%. Visual representations of these solutions for high stickiness behavior can be found in Figures 3A–C. In the context of low stickiness behavior, a more detailed analysis reveals that configuration s4 signifies low stickiness behavior when there is an absence of interactivity, entertainment, cognitive trust, and affective trust, with a do not care condition for visualization. This configuration predicts low stickiness behavior with a consistency of 76.9%. Configuration s5 also highlights that low stickiness behavior can occur with the presence conditions of interactivity and visualization, combined with the absence condition for cognitive trust, and a do not care condition for entertainment and affective trust, resulting in a consistency of 85.4%. These solutions should be considered by managers as they exhibit consistencies above 70%. Moreover, the solutions for both high and low stickiness behavior are diverse, making them adaptable and applicable under various conditions. Visual representations of the configurations for low stickiness behavior can be found in Figures 3D, E.

TABLE 4 Cross-loading matrix.

Items/constructs	AT	CT	ENT	INT	PI	STK	VSL
AT1	*0.912*	0.674	0.489	0.503	0.631	0.617	0.474
AT2	*0.916*	0.648	0.488	0.464	0.602	0.637	0.469
AT3	*0.936*	0.675	0.488	0.466	0.592	0.643	0.472
AT4	*0.932*	0.660	0.501	0.484	0.587	0.620	0.496
AT5	*0.935*	0.669	0.479	0.465	0.593	0.638	0.494
CT1	0.602	*0.871*	0.608	0.620	0.517	0.556	0.552
CT2	0.553	*0.855*	0.647	0.618	0.509	0.493	0.597
CT3	0.667	*0.927*	0.647	0.584	0.585	0.621	0.579
CT4	0.680	*0.910*	0.650	0.576	0.564	0.589	0.580
CT5	0.705	*0.911*	0.604	0.579	0.593	0.613	0.549
ENT1	0.426	0.600	*0.875*	0.586	0.449	0.457	0.534
ENT2	0.484	0.645	*0.911*	0.535	0.448	0.474	0.576
ENT3	0.513	0.656	*0.916*	0.509	0.481	0.527	0.560
INT1	0.385	0.531	0.484	*0.850*	0.356	0.357	0.552
INT2	0.411	0.572	0.494	*0.889*	0.372	0.399	0.587
INT3	0.516	0.595	0.540	*0.867*	0.485	0.467	0.571
INT4	0.475	0.616	0.576	*0.894*	0.439	0.420	0.633
PI1	0.600	0.570	0.469	0.415	*0.916*	0.688	0.431
PI2	0.608	0.587	0.482	0.460	*0.960*	0.669	0.462
PI3	0.625	0.593	0.489	0.468	*0.948*	0.684	0.467
STK1	0.633	0.611	0.530	0.442	0.675	*0.939*	0.432
STK2	0.633	0.600	0.512	0.464	0.678	*0.960*	0.424
STK3	0.675	0.623	0.500	0.440	0.705	*0.952*	0.418
VLS1	0.505	0.609	0.580	0.654	0.472	0.430	*0.923*
VLS2	0.467	0.577	0.563	0.591	0.444	0.394	*0.920*
VLS3	0.453	0.564	0.555	0.596	0.405	0.403	*0.904*

AT, Affective Trust; CT, Cognitive Trust; ENT, Entertainment; INT, Interactivity; PI, Purchase Intention; STK, Stickiness; VSL, Visualization. Italicized numbers are to indicate specific values.

On the other hand, predicting high purchase intention entails three distinct configurations. Configuration p1 suggests that high purchase intention is associated with the presence of visualization and affective trust, considering other constructs as do not care conditions, resulting in a consistency of 94.2%. Configuration p2 indicates high purchase intention when interactivity and affective trust are present, and absence conditions in affective trust, combined with do not care conditions in entertainment and cognitive trust, leading to a solution consistency of 86.8%. The third configuration for high purchase intention, p3, combines the presence of interactivity and cognitive trust with do not care conditions from the other constructs, yielding a solution consistency of 91.9%. Visual representations of these configurations for high purchase intention are presented in Figures 4A–C. In the context of low purchase intention, a more sophisticated analysis reveals that configuration p4 signifies low purchase intention in the absence of interactivity, entertainment, cognitive trust, and affective trust, with a do not care condition for visualization. This

configuration predicts low purchase intention with a consistency of 96.3%. Configuration p5 also highlights that low purchase intention can occur with the presence of interactivity and entertainment, combined with the absence of visualization and affective trust, along with a do not care condition for cognitive trust, resulting in a consistency of 85.8%. Managers should consider these solutions as they exhibit consistencies above 70%. Furthermore, both high and low purchase intention solutions are diverse, rendering them adaptable and applicable under various conditions. Visual representations of the configurations for low purchase intention can be found in Figures 4D, E.

5 Discussion

This research has adeptly navigated the domains of stickiness behavior and purchase intention in live streaming, employing a sophisticated hybrid methodology of Structural Equation

TABLE 5 Summarize of direct hypothesis.

Hypothesis	Path coefficient	T-value	Bootstrapping CI 97.5%		Decision
			Lower	Upper	
H1a, Interactivity → Cognitive trust	0.288***	6.090	0.197	0.382	Supported
H1b, Entertainment → Cognitive trust	0.415***	9.802	0.33	0.496	Supported
H1c, Visualization → Cognitive trust	0.187***	3.755	0.091	0.288	Supported
H2a, Interactivity → Affective trust	0.026	0.442	−0.088	0.139	Rejected
H2b, Entertainment → Affective trust	0.006	0.116	−0.105	0.112	Rejected
H2c, Visualization → Affective trust	0.091	1.383	−0.04	0.217	Rejected
H3, Cognitive trust → Affective trust	0.639***	9.767	0.507	0.764	Supported
H4a, Cognitive trust → Stickiness behavior	0.318***	6.537	0.225	0.416	Supported
H4b, Affective trust → Stickiness behavior	0.452***	9.211	0.351	0.544	Supported
H5a, Cognitive trust → Purchase intention	0.317***	5.750	0.214	0.428	Supported
H5b, Affective trust → Purchase intention	0.421***	7.212	0.305	0.527	Supported

Significance level of ***$P < 0.001$.

TABLE 6 Summarize of mediating hypothesis.

Hypothesis	Path coefficient	T-value	Bootstrapping CI 97.5%		Decision
			Lower	Upper	
H1a, Interactivity → Cognitive trust → Affective trust	0.184***	5.671	0.124	0.252	Full mediation
H1b, Entertainment → Cognitive trust → Affective trust	0.265***	6.293	0.190	0.353	Full Mediation
H1c, Visualization → Cognitive trust → Affective trust	0.119**	3.445	0.055	0.190	Full Mediation

Significance level of ***$P < 0.001$; **$P < 0.010$.

Modeling (SEM) and fsQCA. The study innovatively tests a model grounded in socio-technical theory and confirms the trust transfer mechanism transition from cognitive to affective trust. Notably, it expands the scope of trust transfer application beyond the traditional live streaming context of product trust to streamer trust (Zhang et al., 2022; Shih et al., 2023), to a more nuanced cognitive trust to affective trust paradigm. This progression marks a significant contribution to the existing body of knowledge. Furthermore, the developed model in this study has been rigorously tested, unveiling the mediating effect of cognitive trust in the formation of emotional trust which extent the previous findings of Huang et al. (2022). These findings significantly enhance the understanding of trust dynamics in live streaming, representing a substantial extension from prior studies (Huang et al., 2022; Zhang et al., 2022; Shih et al., 2023). The detailed discussion of these outcomes, provided in the subsequent sections, highlights the research's key role in filling the identified theoretical gaps.

Firstly, the study presents the results for the direct effects, revealing that socio-technical system constructs significantly predict cognitive trust but not affective trust. This indicates that interactivity, entertainment, and visualization in live streaming e-commerce can significantly enhance the cognitive trust of viewers. This finding aligns with prior research, which has shown that interactivity, entertainment, and visualization can enhance consumer trust (Zhang et al., 2022), and extends these findings by introducing cognitive trust as a mediator. Additionally, the research confirms the significance of trust transfer mechanisms,

as evidenced by the substantial influence of cognitive trust on affective trust. This suggests that consumers initially reinforce cognitive trust, which is subsequently converted into affective trust. This finding is in line with the studies by Huang et al. (2022), albeit with a slight variation from Zhang et al. (2022), where their focus was on trust conversion from product to streamer without specific mention of mediating effects. Therefore, this research extends the findings of Zhang et al. (2022) and makes a significant contribution to the body of knowledge, particularly by confirming trust transfer mechanisms at the individual level. Furthermore, the findings regarding the mediating effect confirm that cognitive trust plays a key role in mediating the effects of socio-technical system constructs on affective trust. In other words, the full mediation effect of cognitive trust acts as a driver for enhancing emotional bonds between viewers and streamers in live streaming e-commerce. Therefore, cognitive trust, which includes aspects such as professional background, streamer reliability, and product quality, should be considered first and then converted into emotional bonds. The results of this research extend the findings from Zhang et al. (2022) and Shih et al. (2023). Moreover, for cognitive trust and affective trust, sequentially emerging from socio-technical system constructs, they significantly predict desired outcomes in live streaming e-commerce, such as stickiness behavior and purchase intention. These findings are in line with previous studies by Huang et al. (2022) but differ in the context, as they focused on YouTube product reviews, stickiness behavior, and purchase intention.

TABLE 7	Truth table predicting high stickiness behavior and purchase intention.

Factors predicting high stickiness					Cases	Outcome (high stickiness)	Consistency	Coverage
INT	VLS	ENT	CT	AT				
0	1	1	0	1	1	Yes	0.949	0.638
0	1	1	1	1	1	Yes	0.945	0.702
1	0	1	1	1	2	Yes	0.928	0.667
1	1	0	0	1	2	Yes	0.916	0.470
1	1	1	1	1	481	Yes	0.914	0.932
1	0	1	0	0	1	Yes	0.913	0.420
1	1	0	1	1	1	Yes	0.912	0.608
0	0	0	0	0	1	Yes	0.903	0.228
0	1	0	0	0	1	Yes	0.896	0.230
1	0	1	1	0	2	Yes	0.885	0.369
1	1	1	0	1	2	Yes	0.874	0.483
1	1	0	0	0	1	Yes	0.870	0.254
1	1	1	0	0	5	Yes	0.818	0.309
1	1	1	1	0	21	Yes	0.806	0.531
Factors predicting high purchase intention					Cases	Outcome	Consistency	Coverage
INT	VLS	ENT	CT	AT				
0	1	1	0	1	1	Yes	0.969	0.817
0	1	1	1	1	1	Yes	0.959	0.818
1	0	1	1	1	2	Yes	0.953	0.812
1	1	1	1	1	481	Yes	0.950	0.965
1	1	0	1	1	1	Yes	0.945	0.792
1	0	1	1	0	2	Yes	0.944	0.725
0	1	0	0	0	1	Yes	0.942	0.404
1	0	1	0	0	1	Yes	0.936	0.595
0	0	0	0	0	1	Yes	0.933	0.350
1	1	1	0	1	2	Yes	0.931	0.744
1	1	0	0	1	2	Yes	0.925	0.609
1	1	0	0	0	1	Yes	0.913	0.473
1	1	1	0	0	5	Yes	0.888	0.589
1	1	1	1	0	21	Yes	0.874	0.712

Reflecting on the findings derived from fsQCA reveals novel contributions within the configurations generated for predicting high and low stickiness behavior and purchase intention through socio-technical system constructs and trust. These findings offer distinct insights into marketing strategies for enhancing consumer behavior outcomes. The existence of three configurations predicting high stickiness behavior underscores the significance of specific elements in live streaming marketing. Firstly, the configuration involving the presence of interactivity and entertainment, while other constructs are considered as do not care conditions, suggests that highly interactive and entertaining live streaming significantly influences users' stickiness behaviors.

This finding corresponds with the work of Xue et al. (2020), who emphasized the importance of interactivity and entertainment in live streaming. Additionally, configurations involving the presence conditions of visualization and affective trust, combined with the do not care conditions of interactivity, entertainment, and cognitive trust, highlight the crucial roles of visualization and affective trust, even in the absence of entertainment, interactivity, and cognitive trust. This finding aligns with prior research that emphasizes the importance of visualization and trust in live streaming (Zhang et al., 2022). Furthermore, configurations combining the presence condition of visualization with the absence conditions of entertainment, cognitive trust, and affective trust, along with the

TABLE 8 Truth table predicting low stickiness behavior and purchase intention.

Factors predicting low stickiness					Cases	Outcome (low stickiness)	Consistency	Coverage
INT	VLS	ENT	CT	AT				
0	0	0	0	0	1	Yes	0.971	0.771
0	1	0	0	0	1	Yes	0.968	0.769
1	1	0	0	0	1	Yes	0.955	0.745
1	0	1	0	0	1	Yes	0.937	0.579
1	0	1	1	0	2	Yes	0.932	0.630
1	1	0	0	1	2	Yes	0.925	0.529
0	1	1	0	1	1	Yes	0.911	0.361
1	1	1	0	0	5	Yes	0.910	0.690
1	1	1	0	1	2	Yes	0.882	0.516
0	1	1	1	1	1	Yes	0.871	0.297
1	1	0	1	1	1	Yes	0.863	0.391
1	0	1	1	1	2	Yes	0.855	0.331
1	1	1	1	0	21	No	0.783	0.468
1	1	1	1	1	481	No	0.224	0.067
Factors predicting low purchase intention					Cases	Outcome (low purchase intention)	Consistency	Coverage
INT	VLS	ENT	CT	AT				
0	0	0	0	0	1	Yes	0.964	0.650
0	1	0	0	0	1	Yes	0.960	0.595
1	1	0	0	0	1	Yes	0.921	0.526
1	0	1	0	0	1	Yes	0.906	0.404
1	1	0	0	1	2	Yes	0.891	0.390
0	1	1	0	1	1	Yes	0.864	0.182
1	0	1	1	0	2	Yes	0.852	0.274
1	1	1	0	0	5	Yes	0.845	0.410
0	1	1	1	1	1	Yes	0.818	0.181
1	1	1	0	1	2	Yes	0.800	0.255
1	0	1	1	1	2	No	0.798	0.187
1	1	0	1	1	1	No	0.792	0.207
1	1	1	1	0	21	No	0.710	0.287
1	1	1	1	1	481	No	0.180	0.034

do not care conditions of interactivity, suggest that visualization alone plays a vital role in supporting stickiness behavior. On the other hand, this research also identifies configurations leading to unfavorable stickiness behavior. The results indicate that low stickiness behavior occurs in the absence of interactivity, entertainment, cognitive trust, and affective trust, with a do not care condition for visualization. Additionally, low stickiness behavior is predicted when the presence conditions of interactivity and visualization are combined with the absence condition for cognitive trust, along with a do not care condition for entertainment and affective trust.

In the context of purchase intention, the study reveals five configurations signifying high and low purchase intention in the live streaming environment. It primarily identifies three configurations associated with high purchase intention. The first configuration, which entails the presence of visualization and affective trust, with other constructs considered as do not care conditions, emphasizes the significance of high visualization and cultivate affective trust in driving high purchase intention. This insight guides managers to prioritize the use of visualization and the development of emotional trust in live streaming, as it significantly influences users' purchase intentions. This finding

TABLE 9 fsQCA configuration for predicting high and low stickiness.

Factors	High stickiness			Low stickiness	
Socio-technical system construct	s.1	s.2	s.3	s.4	s.5
Interactivity	•			⊗	•
Entertainment	•		⊗	⊗	
Visualization		•	•		•
Trust					
Cognitive trust			⊗	⊗	⊗
Affective trust		•	⊗	⊗	
Raw coverage	0.946	0.914	0.078	0.224	0.472
Consistency	0.877	0.903	0.850	0.967	0.854
Overall solution coverage	0.976			0.572	
Overall solution consistency	0.850			0.769	

"•" indicating presence of conditions, "⊗" indicating absence of conditions, "blank space", indicating don't care condition.

is in line with the work of Wongkitrungrueng and Assarut (2020), which highlights the importance of visualization and trust. Additionally, configurations that include interactivity and affective trust in the presence conditions, along with the absence of affective trust, combined with do not care conditions for entertainment and cognitive trust, suggest that highly interactive live streaming, coupled with well-cultivated affective trust, leads to high purchase intention. Moreover, configurations combining the presence of interactivity and cognitive trust with do not care conditions for the other constructs underscore the importance of interactivity and trust in the professional background of streamers in supporting purchase intention. Conversely, the research identifies configurations predicting unfavorable purchase intention. The results reveal that low purchase intention occurs in the absence of interactivity, entertainment, cognitive trust, and affective trust, with a do not care condition for visualization. Additionally, low purchase intention is predicted when there is the presence of interactivity and entertainment, combined with the absence of visualization and affective trust, along with a do not care condition for cognitive trust. In conclusion, this research underscores the critical role of combinations of socio-technical system constructs and trust, which managers should consider when developing live streaming strategies to enhance purchase intentions.

6 Implication

6.1 Implication for theory

This study represents a substantial academic contribution by underscoring the fundamental roles played by socio-technical system constructs and trust transfer mechanisms in the domain of live streaming. It emphasizes the necessity for a comprehensive exploration of these components to advance a comprehension of consumer behavior in the context of live-streaming marketing. More specifically, the investigation delineates three principal dimensions of socio-technical system constructs, namely interactivity, entertainment, and visualization. These dimensions

are acknowledged as pivotal antecedents within the realm of live streaming e-commerce, exerting a discernible influence on trust transfer mechanisms and consequential consumer behaviors, such as stickiness behavior and purchase intention. Furthermore, this study extends the trust transfer mechanism by contribute to the pivotal function of cognitive trust in the live streaming environment, where it operates as a significant mediator responsible for transforming socio-technical constructs into emotional bonds. This expansion is especially noteworthy in the light of our examination's alignment with the findings of Zhang et al. (2022) and Shih et al. (2023), primarily concerning the domain of live-streaming commerce. It represents a substantial augmentation, offering a more comprehensive comprehension of this context.

The theoretical contribution of this study is substantiated through the validation of propositions utilizing qualitative comparative analysis, which ultimately reveals the intricate nature of the theory. This approach aligns harmoniously with the scientific method's objective of "enlightening the current state of the theory" (Turner and Baker, 2019), implying an exhaustive exploration of the present theoretical landscape, with a particular focus on the insights proffered by this research in the domain of behavioral intentions. This research effectively extends the pre-existing theory propounded by Wongkitrungrueng and Assarut (2020), Zhang et al. (2022), and Shih et al. (2023), which assumed the impact of socio-technical system theory and trust within the realm of live streaming. However, this study's unique accomplishment is evident in its ability to expose latent insights through a comprehensive amalgamation of various facets of socio-technical system constructs and trust. This synthesis culminates in the formulation of a conceptual framework aimed at optimizing content marketing practices in the domain of live streaming marketing. Consequently, this study offers a substantial theoretical contribution by revealing innovative configurations that forecast both high and low degrees of stickiness behavior and purchase intention within the context of live streaming. These configurations furnish invaluable theoretical insights into the pivotal roles played by socio-technical system constructs and trust in shaping

FIGURE 3
(A–E) Stickiness high vs. low.
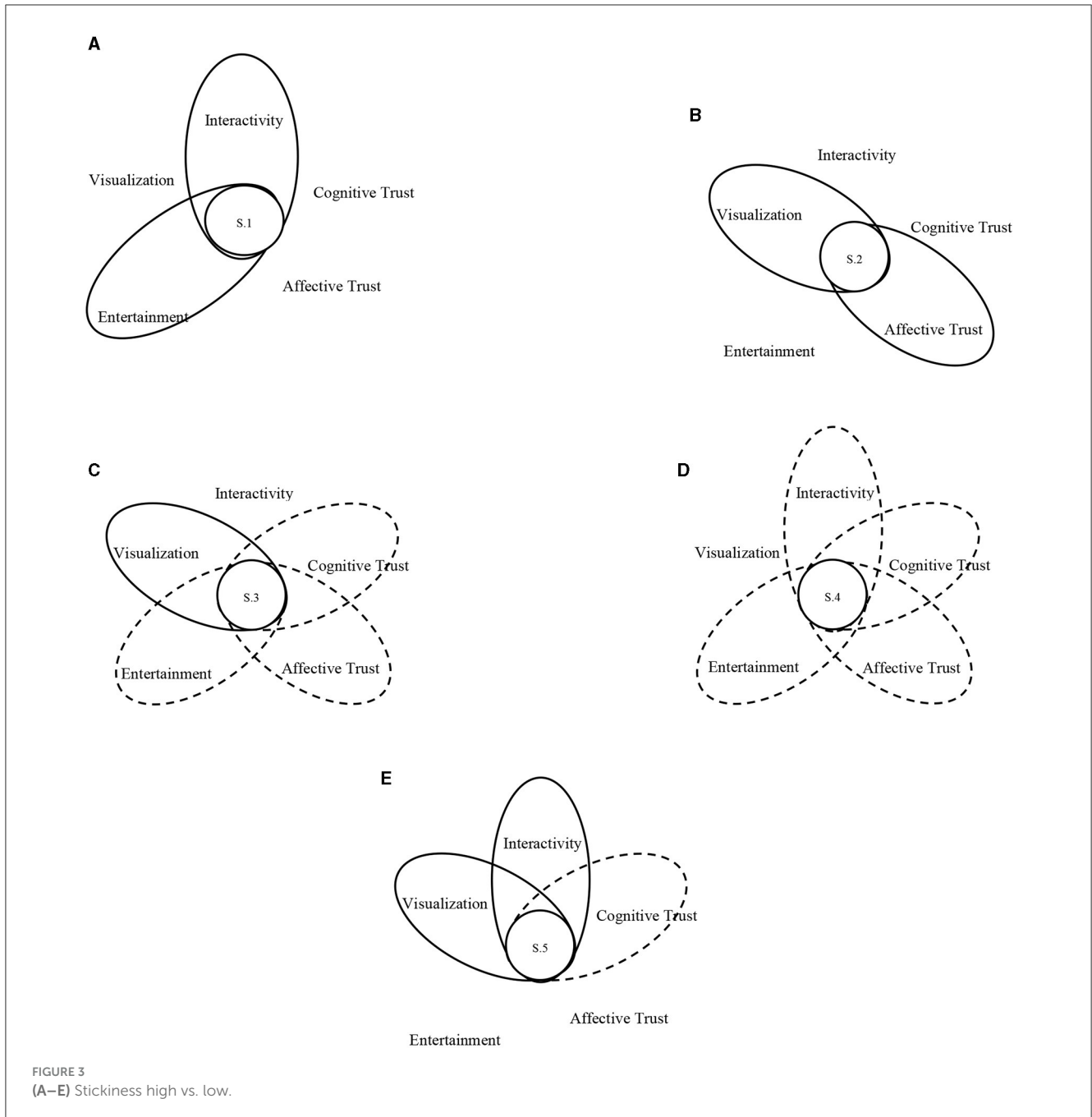
consumer behaviors. The delineation of specific components, such as interactivity, entertainment, visualization, and affective trust, as drivers of stickiness behavior and purchase intention, enriches our theoretical comprehension of live streaming marketing. By way of illustration, the confirmation of the pivotal role of visualization and affective trust in fostering high purchase intention fortifies the theoretical underpinning emphasizing the significance of transparency and emotional bonds within the live-streaming environment. Moreover, the identification of configurations indicative of unfavorable outcomes, wherein the absence of interactivity, entertainment, cognitive trust, and affective trust results in diminished purchase intention, contributes to the theoretical discourse by accentuating the detrimental ramifications

of neglecting these constituents. In summary, this research bolsters the theoretical framework by presenting a nuanced understanding of the interconnectedness of socio-technical system constructs, trust, and consumer behavior within the live streaming milieu, thereby offering a wealth of insights to guide future research in this domain.

6.2 Implication for e-commerce live streaming practice

Live streaming practitioners can significantly influence viewers' cognitive trust by prioritizing interactivity, entertainment, and

FIGURE 4
(A–E) Purchase intention high vs. low.
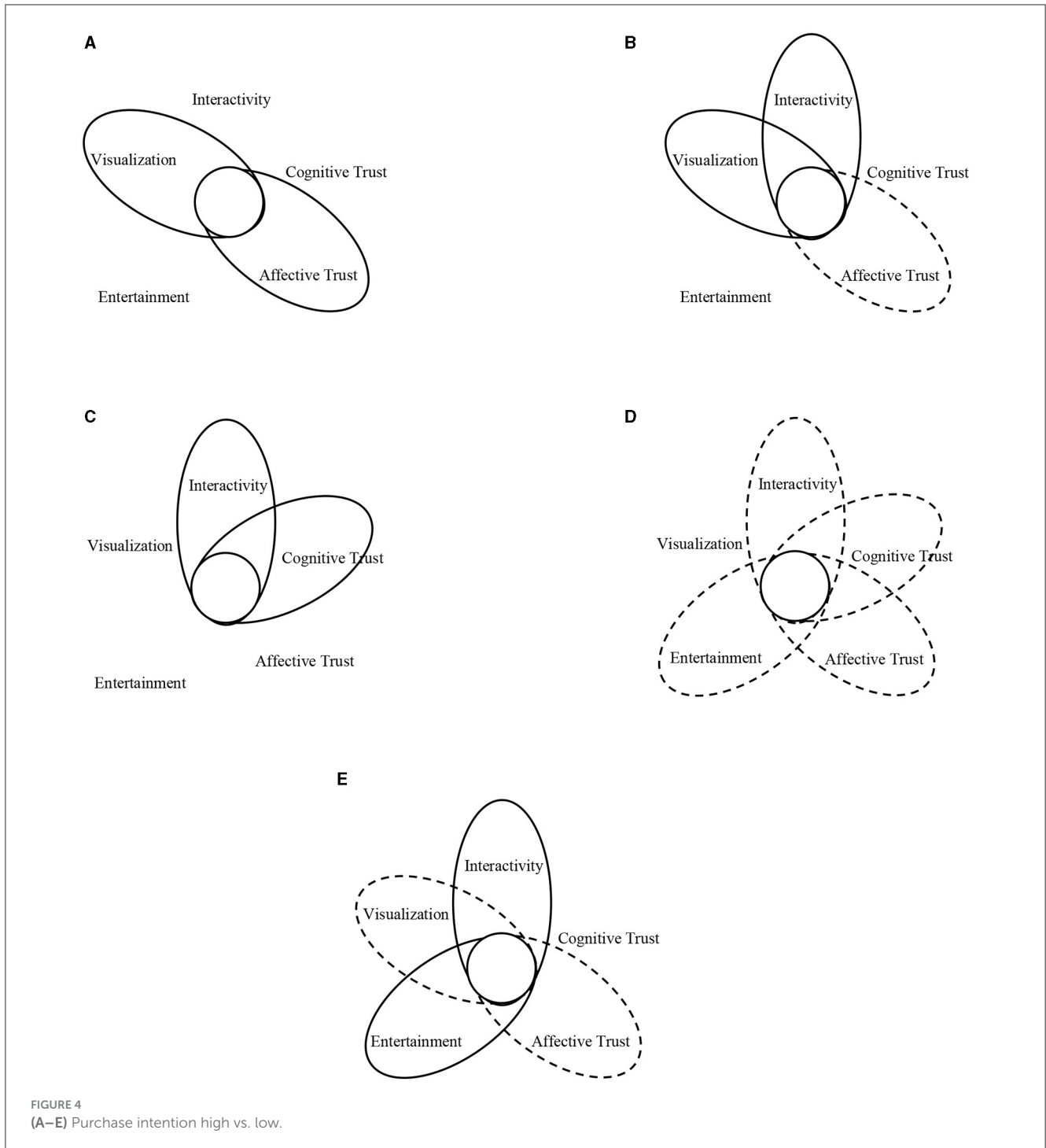
visualization in their content. This study confirms that these elements play a vital role in bolstering cognitive trust, which, in turn, contributes to the development of viewers' trust in the live streamer and the products being presented. Managers can leverage this insight to enhance viewer trust by creating engaging and visually appealing live streaming content. The development of viewer trust in the live streaming context can be a pivotal step in building and retaining a loyal audience. This emphasis on cognitive trust as a precursor to affective trust signifies the need for streamers and platforms to establish credibility, offer transparent

information, and provide reliable content. Thus, it is crucial for live streaming practitioners to consider these aspects in their content strategies and presentation.

Understanding the mechanisms of trust transfer, specifically the shift from cognitive trust to affective trust, is imperative for live streaming practitioners. This research highlights that consumers initially reinforce cognitive trust, which subsequently evolves into affective trust. This sequential trust transfer mechanism indicates that practitioners should aim to cultivate cognitive trust among their viewers through factors like professional background,

streamer reliability, and product quality. By doing so, they can pave the way for the development of emotional bonds with viewers. Practitioners should invest in fostering viewers' cognitive trust by showcasing their professionalism, authenticity, and commitment to product quality. This, in turn, can translate into stronger emotional connections with their audience. Understanding the broader perspective of trust transfer can help practitioners devise strategies to connect more deeply with their viewers, leading to stronger and more lasting relationships in the live streaming ecosystem.

The configurations generated through this research provide practitioners with specific guidance on enhancing viewer engagement and purchase intention in the live streaming environment. Configurations emphasizing the presence of interactivity and entertainment as drivers of high stickiness behavior underline the importance of creating highly interactive and entertaining live streaming content to keep viewers engaged. Practitioners can use this information to craft content strategies that prioritize these elements. Moreover, configurations involving visualization and affective trust as drivers of high stickiness and purchase intention signify the significance of maintaining transparency and building emotional bonds, even in the absence of other elements. This insight can guide practitioners in fostering stronger relationships with viewers and encouraging them to take purchase-related actions. Similarly, understanding the elements that lead to low stickiness behavior and purchase intention can help practitioners avoid strategies that result in unfavorable outcomes. For example, steering clear of a lack of interactivity, entertainment, cognitive trust, and affective trust in their content can help maintain viewer engagement and purchase intent.

The results from this study provide valuable insights for managerial decision-making in the live streaming context. Practitioners are encouraged to prioritize interactivity, entertainment, and visualization to enhance cognitive trust, thereby building the foundation for trust transfer mechanisms and affective trust. This emphasizes the importance of engaging and visually appealing content. Additionally, practitioners should be aware of the sequence in which trust is developed, recognizing that cognitive trust precedes affective trust. By focusing on aspects such as professional background, reliability, and product quality, they can accelerate the development of emotional bonds with viewers. Furthermore, the configurations identified for stickiness behavior and purchase intention guide practitioners in crafting content and strategies that resonate with viewers, fostering greater engagement and encouraging purchase-related actions. By considering these configurations, practitioners can make informed decisions that contribute to the growth and success of live streaming practices.

7 Limitations and future research

While this comprehensive study provides valuable insights into consumer behavior in live streaming, several limitations warrant consideration for future research. Firstly, the context-specific nature of the findings prompts the exploration of their applicability in diverse live streaming settings. Second, future studies should diversify data collection methods by integrating self-reports with objective measures for a more robust analysis. Third, the adoption of alternative research methodologies, such as experiments or

ethnography, could yield deeper insights. Given the dynamic nature of live streaming platforms, longitudinal investigations are crucial to track evolving user behavior. Furthermore, macro-level influences, such as cultural and regulatory factors, demand attention. Lastly, addressing potential omitted variables to enhance research comprehensiveness is advisable. In sum, while this study advances our understanding of socio-technical constructs and trust transfer mechanisms in live streaming, future research avenues should address these limitations to offer a more comprehensive view of this dynamic domain.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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