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# From attention to action: How streamers, products, and scenes shape customer value co-creation in agricultural livestreaming

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Agricultural livestreaming often struggles to convert viewers from passive spectators into active co-creators of value. Guided by Social Cognitive Theory, this study examines whether and how viewers' psychological engagement functions as the consumer-side mechanism that links perceived livestream cues to product-centered participation. A structural model was developed integrating streamer characteristics (i.e., credibility, likability, rural identity salience), product attributes (i.e., information, quality, cost-value ratio), and scene features (i.e., authenticity, transparency). Data from a survey of 479 Chinese viewers underwent analysis via PLS-SEM. Findings indicate that all cues except likability exert a substantial effect on psychological engagement, with rural identity salience and scene transparency demonstrating the most pronounced impacts. Psychological engagement substantially predicts four forms of customer participation in value co-creation behaviors: information seeking, information sharing, responsible behavior, and personal interaction, with the first two exhibiting the largest effect sizes. Findings extend Social Cognitive Theory to agri-product commerce by showing that cognitive and affective engagement connects environmental cues to customer participation in value co-creation. Identity-based and scene-based signals carry greater weight than interpersonal warmth in credence-dominant contexts, highlighting a credibility-over-charisma pattern. Practically, the study recommends identity performance by grassroots streamers, scene-transparent storytelling that viewers can verify on camera, clear cost–value communication, and platform features that support multi-angle on-site visuals and real-time interaction.

KEYWORDS

**agricultural livestreaming, psychological engagement, social cognitive theory, value co-creation, rural identity salience, scene features**

## Introduction

Livestreaming represents a common marketing strategy that facilitates immediate interaction between broadcasters and audiences (Ye X. et al., 2023). Initially associated with entertainment, its application in commerce has extended to various sectors (Lim et al., 2020), including agriculture in China, supported by policies like "Internet Plus Agriculture." Different from methods in the West that depend on expert endorsers, farming livestreaming in China commonly involves local actors including community administrators, group directors, and cultivators (Li and Li, 2024). The local framework modifies the patterns of value generation,

demanding engaged buyer involvement to confirm genuineness, evaluate standards, and form confidence systems that conventional star approvals supply inherently. On one hand, it offers unprecedented potential for rural economic revitalization, enabling farmers to capture greater value through direct consumer connections and premium pricing for authenticated products. On the other hand, the success of the model depends critically on transforming passive viewers into active co-creators who contribute knowledge, advocate for products, and build community around agricultural brands. Understanding the mechanisms that drive the transformation from passive consumption to active participation is essential for sustaining rural development through digital commerce (Gao and Qiao, 2025). Nevertheless, existing knowledge concerning the stimulation of customer involvement in farming livestreaming appears inadequate (Li et al., 2024).

Despite agricultural livestreaming has seen widespread use in China, is often characterized by limited viewer participation, with engagement mostly restricted to passive viewing for entertainment or discounts. Inactive conduct curbs the ability of the medium for establishing local brands and mutual generation. Prior studies have identified key factors influencing customer participation in value co-creation, such as entertainment and social presence (Chou et al., 2022), perceived value (Liu and Tan, 2023; Wang et al., 2024a), functional, hedonic, and social values (Ye X.-M. et al., 2023), affordances including interactivity and visibility (Hua et al., 2023), experiential value (Yu et al., 2024), and incentive mechanisms (Zhang and Xu, 2024). Even though particular elements include engagement actively (for instance, via perceived value mediating resource utilization), they commonly prioritize external stimuli instead of internal cognitive and affective states as determinants of continued involvement. From a Social Cognitive Theory (SCT) perspective, value co-creation entails the interaction of environmental, personal, and behavioral elements (Bandura, 2001). Although prior studies have identified environmental stimuli, they overlook how personal cognitive and affective states shape behavioral outcomes. Psychological engagement, defined as a multidimensional construct comprising attention, enthusiasm, and absorption, reflects a user's mental and emotional involvement in livestreaming (Liu et al., 2025). Its role as a driver of participatory co-creation remains underexplored, particularly in agricultural contexts where value co-creation focuses on customer interactions with products, such as information seeking, sharing feedback on presentations, or expressing recognition of authenticity (Yi and Gong, 2013; Wang and Fan, 2021; Guo H. et al., 2022). Active contributions necessitate continued engagement to produce mutual value between streamers and viewers. Accordingly, this study seeks to examine the effect of psychological engagement on customer involvement in value co-creation. The study recognizes that consumers are not homogeneous recipients of livestream content; rather, their varying levels of attention, enthusiasm, and absorption represent critical personal characteristics that shape how environmental stimuli translate into participatory actions. By positioning psychological engagement as the central consumer characteristic, we acknowledge that value co-creation emerges from consumers' internal psychological resources.

Prior research on livestreaming commerce has identified several environmental factors that shape viewer attention and purchase intention, such as real-time interaction (Gu et al., 2023; Tian and Frank, 2024), vivid product information (Sawmong, 2022), streamer attributes (Peng et al., 2024; Pu et al., 2025), and the authenticity or aesthetic quality of the broadcast setting (Lv et al., 2022). Such elements correspond to three key dimensions of a livestream: the speaker (streamer), the display (product), and the location (scene). Existing investigations commonly examine isolated aspects of the livestreaming experience without integrating them into a coherent framework. Since psychological engagement is likely influenced by their combined presence, a more integrated approach is required (Onofrei et al., 2022). The present study addresses this gap by examining how these joint cues drive engagement to foster participatory value co-creation in agricultural livestreaming. Moreover, prior work has largely neglected the symbolic significance of broadcast environments (Yuan et al., 2025), particularly in agricultural settings where scene features like landscape authenticity and transparency signal credibility and enhance engagement's proactive role in sustaining behaviors such as information sharing and interaction (Fu et al., 2025).

Among the three dimensions of livestream cues, research on streamer characteristics is the most developed. Prior studies have examined attributes such as physical attractiveness (Wang et al., 2024b), expertise (Zhao et al., 2019), and communication style such as interactivity (Zhang et al., 2022), with a predominant focus on professional influencers. By contrast, agricultural livestreaming frequently features local hosts whose credibility stems from their embeddedness in rural culture and direct involvement in production processes (Li and Li, 2024). In agricultural livestreaming, rural identity serves as a critical trust mechanism that potentially transforms viewers from skeptical observers into active co-creators (Dong et al., 2023; Han et al., 2024; Li et al., 2024). When consumers perceive authentic rural identity, they are more likely to engage in verification activities, share product experiences, and advocate for farmers' products—behaviors that constitute value co-creation. Without understanding how identity-based signals activate these participatory behaviors, efforts to leverage agricultural livestreaming for rural development will remain ineffective. However, existing literature offers limited conceptual frameworks to account for this identity-based signal. To address this gap, the present study introduces the concept of rural identity salience as a key antecedent of psychological engagement and subsequent co-creation behaviors, positioning it as essential for understanding how grassroots streamers mobilize consumer participation within SCT's observational learning framework.

To address the identified research gap, this study draws upon SCT to examine how livestreaming environmental cues shape psychological engagement and encourage customer participation in value co-creation. Specifically, the study addresses the following core research problem: (1) How do livestreaming environmental cues (i.e., streamer characteristics, product attributes, and scene features) influence psychological engagement? and (2) how does this engagement subsequently drive customer participation in value co-creation behaviors in agricultural livestreaming contexts? The study offers several contributions. First, it reconceptualizes psychological engagement as a proactive driver of value co-creation rather than a passive media response. Second, it addresses the lack of an integrated perspective by examining how streamer attributes, product presentation, and scene settings jointly influence engagement. Third, it introduces rural identity salience to capture the symbolic influence of streamers embedded in agricultural life. Fourth, it highlights the role of scene-based features such as transparency and authenticity, which

remain underexplored in agricultural contexts. Theoretically, the study extends SCT to digital co-creation contexts. Practically, it offers actionable insights for rural hosts and brand developers aiming to build participatory and credible livestreaming experiences.

# Literature review

## Intersections of live-streaming and customer participation in value co-creation

Customer participation in value co-creation has attracted growing attention in marketing and service research due to its capacity to enhance mental simulation through entertainment, social presence, and self-referential processing during livestreaming experiences (Chou et al., 2022). Livestream commerce, in particular, provides an interactive environment that enables real-time engagement between viewers and streamers (Hua et al., 2023). Such interaction allows customers to take on an active role in co-creation, generating personalized and meaningful experiences through continuous exchanges with the brand (Prahalad and Ramaswamy, 2004; Vargo et al., 2008). Viewers contribute by commenting, asking questions, sharing content, or influencing product presentation, all of which support value co-creation (Zhang and Xu, 2024). Recent studies have examined this phenomenon through diverse theoretical lenses (see Table 1) including service-dominant logic (SDL) (Liu and Tan, 2023; Yu et al., 2024), and stimulus-organism-response models (Ye X.-M. et al., 2023; Wang et al., 2024a). The empirical study showed that value co-creation manifests through various customer behaviors, from mental simulation and social presence enhancement (Chou et al., 2022) to active knowledge integration and resource sharing (Ye X.-M. et al., 2023). Platform characteristics such as information quality, functional features, and interaction capabilities significantly influence co-creation outcomes (Hua et al., 2023; Wang et al., 2024a), while immersive technologies and scene-related features like novelty and aesthetics enhance experiential value and participation (Yu et al., 2024). Within service ecosystems, value co-creation emerges through customers' active involvement across multiple touchpoints, with interactions between firms, users, and contextual actors shaping perceived value (Liu and Tan, 2023). Incentive mechanisms further drive consumer-brand interactions and engagement in livestreaming commerce (Zhang and Xu, 2024). However, despite these valuable insights, existing research predominantly examines single or dual factors in isolation, overlooking how multiple environmental cues, particularly the integration of streamer characteristics, product attributes, and scene features, simultaneously influence psychological engagement and subsequent co-creation behaviors.

## Underpinning theory: social cognition theory

Social cognitive theory (SCT), first introduced by Bandura (1989, 2001), provides a foundational framework for understanding how individuals acquire and modify behavior through the interaction of personal, behavioral, and environmental factors. At the core of SCT is the principle of triadic reciprocal determinism, which suggests that these three elements operate interactively to shape how individuals attend to, interpret, and respond to social information (Bandura, 1989; Schunk and DiBenedetto, 2020). SCT is particularly applicable to agricultural livestreaming for three reasons. First, agricultural livestreaming exemplifies observational learning where viewers watch farmers demonstrate authentic production processes, assess quality through visual cues, and learn agricultural practices they cannot physically experience. Second, the absence of physical product inspection makes vicarious experience central to trust formation, aligning with SCT's emphasis on learning through observation rather than direct experience. Third, SCT's triadic framework captures the unique dynamics where environmental factors (rural production settings), personal factors (consumer psychological states), and behavioral factors (participatory actions) continuously interact to shape value co-creation.

SCT has been widely applied to explain consumer engagement in digital environments, including livestreaming and social media, where real-time interaction and symbolic cues are central to user experience (Claffey and Brady, 2019; Lim et al., 2024). Consumer engagement in digital platforms is shaped not only by technological affordances but also by users' cognitive evaluations, emotional responses, and exposure (Muhammad et al., 2021). For instance, Schneider et al. (2022) demonstrate that influencer actions and feedback elicit parasocial and emotional reactions, while Wang and Huang (2023) show that influencer credibility increases consumer participation. However, limited research has applied SCT to examine how streamer attributes, product features, and scene settings jointly influence psychological engagement and value co-creation in agricultural livestreaming, where observational learning and emotional resonance are especially prominent.

To enrich the existing literature, the present study extends the application of SCT to the context of agricultural livestreaming and participatory value co-creation. First, building on Bandura's (2012) suggestion that scholars should investigate how emerging media give rise to new behavioral patterns, we examine how grassroots streamers' authentic behavioral modeling replaces traditional marketing signals. This study applies SCT to explain how viewers interpret environmental cues and how these interpretations contribute to psychological engagement. SCT proposes that individuals form emotional and behavioral responses through cognitive evaluation of mediated stimuli (Bandura, 2001). Second, agricultural livestreaming aligns well with the assumptions of SCT, as it provides a socially embedded space in which viewers observe, interpret, and respond to symbolic and behavioral cues (Li and Li, 2024). Such behaviors are acquired through observational learning, where viewers adjust their own conduct by watching others' actions, and self-regulate based on internal beliefs, goals, and competencies (De Oliveira Santini et al., 2020). The observational learning process is particularly salient in agricultural contexts where consumers cannot physically verify product claims and must rely on vicarious assessment of streamer behaviors, production environments, and peer interactions. Accordingly, this study develops a framework suggesting that customer participation in agricultural value co-creation is shaped by behavioral factors (co-creation actions), environmental factors (streamer, product, and scene features), and personal factors (psychological engagement). The mechanisms and linkages are discussed in the following section. This triadic conceptualization directly translates SCT's reciprocal determinism into measurable constructs specific to agricultural livestreaming.

TABLE 1 Representative studies.

| Author (year) | Research objectives | Methods used | Underpinning theory | Customer participation in value co-creation |
|---|---|---|---|---|
| Chou et al. (2022) | To examine how value co-creation influences consumers' mental simulation and continued livestreaming use, and whether social influence moderates these relationships. | Quantitative, China, Taiwan ($N$ = 463) | Narrative transportation theory | Value co-creation between live-streamers and consumers enhances mental simulation by increasing entertainment, social presence, and self-reference during the livestream experience. |
| Wang et al. (2024a) | To investigate the characteristics of live streaming e-commerce platforms and their influence on consumer value co-creation and co-destruction behaviors. | Quantitative, China ($N$ = 212) | SOR framework | Platform information quality, functional quality, and interaction quality positively influence consumer value co-creation while reducing value co-destruction, with perceived value mediating these effects. |
| Ye X.-M. et al. (2023) | To explore e-commerce livestreaming through an empirical study examining customer engagement, value co-creation, and loyalty across multiple platform features. | Quantitative, China ($N$ = 475) | SOR framework | Customer engagement drives value co-creation by integrating functional, hedonic, and social values through active use of knowledge and resources. |
| Hua et al. (2023) | To investigate the juxtaposed affordances of live streaming e-commerce (BLSE), focusing on both positive and negative impacts on customer behavior. | Mixed-methods approach, China ($N$ = 379) | Affordance theory, vicarious learning theory, and cognitive load theory | Positive affordances such as interactivity, visibility, entertainment, and cognitive support promote value co-creation by enhancing engagement and purchase intention. In contrast, negative affordances like excessive broadcasting may reduce purchase intention and weaken co-creation outcomes. |
| Ye X.-M. et al. (2023) | To investigate the relationships among physical cues, customer engagement, value co-creation, and customer loyalty | Quantitative, China ($N$ = 404) | SOR framework | Physical cues in e-commerce live broadcasts enhance customer engagement, influencing value co-creation. |
| Yu et al. (2024) | To identify a value co-creation framework for live streaming through tourism scenes | Mixed-methods approach, China ($N$ = 578) | SDL | Value co-creation in livestreaming is driven by immersive technologies and scene-related features such as novelty, balance, and aesthetics, which enhance experiential value and audience participation. |
| Liu and Tan (2023) | To unpack the value co-creation process on Sports Live Streaming Platforms (SLSPs) using the value creation sphere model | Qualitative, China (N = 14) | Value creation sphere model and SDL | Value co-creation is shaped by customers' active involvement within service ecosystems, where interactions with firms, other users, and contextual actors influence perceived value. |
| Zhang and Xu (2024) | To designs an incentive mechanism to encourage consumer participation in value co-creation under two live streaming sales modes | Analytical models | Not mentioned | Value co-creation in live streaming commerce is driven by consumer–brand interactions, consumer engagement, and the presence of well-calibrated incentive mechanisms. |

# Hypothesis development

## Streamer characteristics and psychological engagement in agricultural livestreaming

SCT highlights that individuals learn and respond based on observed behaviors, especially when the observed actors are perceived as credible, likable, or socially relatable (Palma et al., 2019). Such characteristics activate pre-existing social schemas, which in turn enhance both motivation and emotional response (Xu et al., 2020). In livestreaming contexts, emotional responses are not passive but evolve into psychological engagement, which includes focused attention, enthusiasm, and mental absorption (Liu et al., 2025), is shaped by both cognitive and affective responses to external stimuli. In agricultural livestreaming, where sensory cues such as touch and smell are absent, customers often rely on streamer credibility to assess authenticity and reduce uncertainty (Chen et al., 2022). Credible streamers, perceived as trustworthy and knowledgeable, enhance both cognitive focus and emotional commitment through the development of cognitive and emotional trust (Shen et al., 2022). Empirical studies further suggest that credibility strengthens parasocial relationships and facilitates swift guanxi, which reinforce psychological engagement (Guo et al., 2021; Xu et al., 2022).

Moreover, likability is another influential characteristic. Streamers who appear warm, friendly, and relatable foster emotional connection, thereby increasing attention and enthusiasm (Guo Y. et al., 2022; Kim and Kim, 2022). Such likable traits build parasocial bonds and emotional immersion, leading to repeated engagement (Lim et al., 2020; Luo L. et al., 2024). Furthermore, the salience of a rural identity enhances perceived authenticity and emotional alignment, which is particularly relevant in agricultural livestreaming, where consumers must rely on social rather than physical cues (Cheng et al., 2025). When streamers effectively communicate their rural background, they build trust and deepen relational involvement, leading to stronger cognitive and emotional engagement (Yu and Zhang, 2022). Building on these insights, we posit that streamer characteristics serve as key antecedents of psychological engagement in agricultural livestreaming. Therefore, we propose the following hypotheses:

> *H1a:* Streamer credibility positively influences customer psychological engagement.
>
> *H1b:* Streamer likability positively influences customer psychological engagement.
>
> *H1c:* Streamer rural identity salience positively influences customer psychological engagement.

## Product characteristics and psychological engagement in agricultural livestreaming

In livestream commerce, product characteristics function as essential informational and experiential elements that shape how viewers interpret and respond to presented content. Among these characteristics, product information, perceived quality, and cost-value ratio represent core dimensions that influence psychological engagement. In agricultural livestreaming, detailed and transparent product information compensates for the absence of direct sensory experience, thereby facilitating emotional connection and trust (Yu and Zhang, 2022; Li et al., 2024). Streamers who provide comprehensive descriptions of environmentally friendly or green products improve customer understanding, which in turn increases attention and emotional absorption (Zheng et al., 2023). Prior research indicates that high-quality product information acts as a form of informational support, triggering deeper cognitive processing and reinforcing engagement (Qin et al., 2023; Luo X. et al., 2024). In terms of product quality, the presentation of high-quality agricultural products has been associated with enhanced consumer satisfaction and increased emotional involvement (Wang Y. et al., 2024). Features such as freshness, cleanliness, and transparent production methods strengthen perceived credibility, thereby supporting more intense engagement (Li et al., 2024). Additionally, when consumers perceive the product as offering good value for its price, this perception enhances both cognitive interest and emotional resonance (Yu and Zhang, 2022). Promotional mechanisms such as discounts and bundle offers may increase perceived fairness, build trust, and support engagement, particularly in agricultural livestreams where transparent pricing plays a critical role (Büyükdağ et al., 2020; Pan et al., 2022). Building on these insights, we propose the following hypotheses:

> *H2a:* Product information positively influences customer psychological engagement.
>
> *H2b:* Product quality positively influences customer psychological engagement.
>
> *H2c:* Perceived cost-value ratio positively influences customer psychological engagement.

## Scene settings and psychological engagement in agricultural livestreaming

Scene settings refer to the environmental cues and visual context presented during livestreaming that shape how viewers cognitively and emotionally engage with the content (Yu et al., 2024). In agricultural livestreaming, perceived scene authenticity and scene transparency are two core dimensions that influence viewers' trust, emotional connection, and attention. Perceived scene authenticity reflects how real and unembellished the livestreaming environment appears to viewers (Dong et al., 2023). The scene authenticity serves as a powerful stimulus, enhancing both informational and emotional support and ultimately increasing customer engagement (Qin et al., 2023). When the broadcast features actual farm environments or real-time production processes, it conveys credibility and fosters trust and emotional involvement (Li et al., 2024; Goel and Garg, 2025). Prior studies suggest that realistic and immersive visual settings enhance social presence and inspiration, both of which contribute to stronger psychological engagement (Song et al., 2024). This is particularly relevant in agricultural settings where sensory information is limited, and authenticity becomes a substitute for direct experience. Additionally, scene transparency is defined as the clear and accessible presentation of product origin and production processes (Fu et al., 2025). The visualization of production steps during livestreams strengthens trust and reinforces belief in product claims, thereby enhancing attention and emotional commitment (Li et al., 2024).

Transparent scene design further increases perceptions of social support and interactive communication, which promotes a greater sense of presence and deeper engagement with the content (Han et al., 2024). Building on these insights, we propose the following hypotheses:

> *H3a:* Perceived scene authenticity positively influences customer psychological engagement.
>
> *H3b:* Perceived scene transparency positively influences customer psychological engagement.

## Psychological engagement and customer value co-creation behavior in agricultural livestreaming

Under SCT, human behavior is shaped through reciprocal interactions among personal cognition, observed behavior, and environmental influences (Bandura, 1989). In agricultural livestreaming, psychological engagement emerges as a personal state resulting from observing credible, likable, and value-aligned streamer behaviors. These behaviors, embedded in immersive and interactive environments, function as vicarious learning sources that activate viewers' internal motivation and self-regulatory processes. Through this mechanism, psychologically engaged viewers are more likely to exhibit customer value co-creation behaviors. In this study, customer value co-creation refers to voluntary, interactive actions that contribute to the perceived or actual value of agricultural products. It comprises four key dimensions: information seeking, information sharing, responsible behavior, and personal interaction (Yi and Gong, 2013). Psychologically engaged viewers tend to explore how agricultural products are cultivated, processed, or sourced, particularly in the absence of direct sensory experience (Zheng et al., 2023; Sereenonchai and Arunrat, 2024), reflecting the SCT principle that attention enhances observational learning and facilitates goal-directed action. Likewise, engaged consumers are more likely to share product-related content, offer feedback, and influence others through word-of-mouth (Fait et al., 2019). SCT explains this as social reinforcement, whereby individuals reproduce behaviors that are socially recognized or internally rewarding (Itani et al., 2020).

Emotional and cognitive engagement also supports responsible behaviors, such as endorsing sustainable agricultural practices or participating in rural development efforts, which reflect internalized moral learning and collective identity with the livestream setting (Chuah et al., 2020; Reppmann et al., 2024). Furthermore, engagement fosters personal interaction, such as commenting, asking questions, and expressing emotions during the livestream (Blasco-Arcas et al., 2016). These behaviors create a participatory environment in which viewers feel acknowledged and socially connected. SCT suggests that such interactions reinforce learning outcomes and provide social validation, thereby sustaining consumers' motivation to co-create value (Ting et al., 2021; Roy et al., 2022). Building on these insights, we hypothesize:

> *H4a:* Psychological engagement positively influences customer information seeking behavior.
>
> *H4b:* Psychological engagement positively influences customer information sharing behavior.
>
> *H4c:* Psychological engagement positively influences customer responsible behavior.
>
> *H4d:* Psychological engagement positively influences customer personal interaction behavior.

The proposed research model is presented in Figure 1.

# Methodology

## Data collection and sampling

This study employed a cross-sectional online survey to examine livestreaming environment, psychological engagement, and customer participation in value co-creation within agricultural livestreaming in China. The focal population comprised Chinese viewers who had watched agricultural product livestreams hosted by grassroots streamers (e.g., farmers, village officials, or cooperative members) within the past three months. A non-probability purposive sampling strategy was used. A screening question admitted only respondents who reported prior viewing of agricultural livestreams hosted by grassroots streamers rather than professional influencers or celebrities (Saunders et al., 2009). Data were collected in March 2025 via Wenjuanxing (Sojump), a widely used online survey platform in China. A total of 626 responses were received. Respondents first viewed the consent statement and proceeded only after agreeing to participate voluntarily and anonymously. Standard data-quality checks were implemented, which including straight-lining answer. After data cleaning, 479 valid responses were retained, exceeding the G*Power minimum requirement of 160 for detecting a medium effect size with 0.95 power (Faul et al., 2009). The sample was 53% female and 47% male, with most aged 18–34. A majority held a bachelor's degree and above (68%), and the largest occupational group was students (37%). Geographically, 35% were from South China. All respondents had viewed agricultural product livestreams from rural-identity streamers, though only 22% had made purchases. Viewing frequency varied, with 18% watching almost daily and 23% watching only once or twice (see Table 2). The above sample includes sufficient variance across key dimensions: demographic diversity (age, education, region), behavioral patterns (viewing frequency, purchase history), and engagement levels.

## Measures

Measurement instruments (see Appendix 1) were adapted from validated scales and pre-tested for clarity, relevance, and content validity in the context of agricultural livestreaming. All items used a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). A bilingual Chinese–English version underwent back-translation to ensure linguistic equivalence (Brislin, 1970). Content validity was reviewed by five experts in digital marketing and agricultural e-commerce. A pilot test with 49 participants assessed clarity, and reliability (Hunt et al., 1982). All constructs exceeded the recommended Cronbach's alpha threshold of 0.70.

All constructs except psychological engagement are unidimensional. Streamer characteristics were measured as three unidimensional

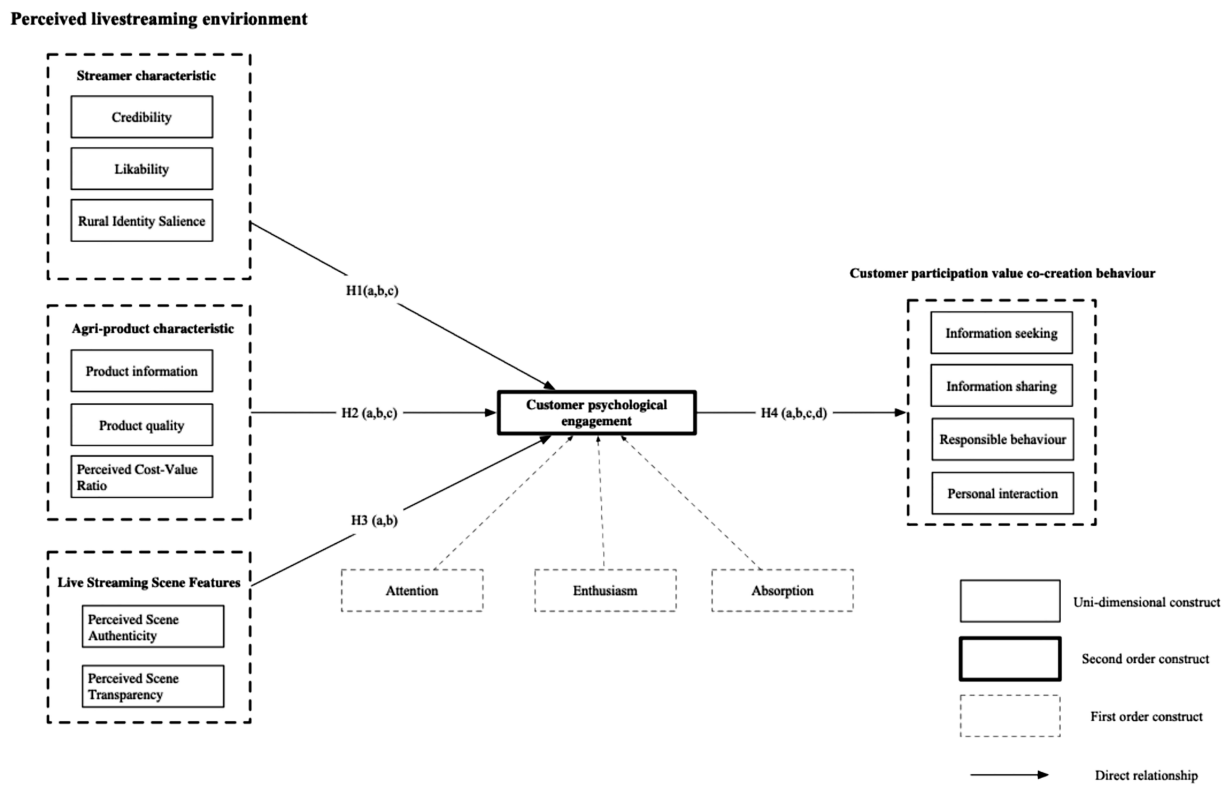


FIGURE 1
Research framework.

constructs. Credibility was adapted from Soares et al. (2024). Likability is based on Liang et al. (2025). Rural identity salience operationalizes contextual salience from the identity salience questionnaire framework (Hinton et al., 2024), capturing how clearly a streamer's rural identity becomes noticeable during the livestreaming. Product characteristics were measured as three unidimensional constructs. Product information, product quality, and perceived cost value ratio were all adapted from Yuan et al. (2025). Scene characteristics were assessed as two unidimensional constructs. Perceived scene authenticity captures the genuineness and unmodified nature of the livestreaming environment, including farmland and rural settings, which is based on Dong et al. (2023). Perceived scene transparency refers to the accuracy, consistency, and truthfulness of environmental visuals showing production conditions, which is adapted from Fu et al. (2025). Psychological engagement was conceptualized as a second order construct comprising attention, enthusiasm, and absorption, with items adapted from Liu et al. (2025). Customer participation in value co-creation was measured across four unidimensional constructs (i.e., information seeking, information sharing, responsible behavior, personal interaction). They were all adapted from Bu et al. (2022) and Yi and Gong (2013).

## Data analysis

As part of this study, SPSS 26 was used to conduct frequency analysis, while SmartPLS 4.1.1.2 was employed to estimate the partial least squares structural equation model (PLS-SEM). SmartPLS is widely recognized for its ability to handle complex models involving multiple latent constructs and hierarchical structures (Hair et al., 2019). PLS-SEM was selected due to its suitability for predictive and exploratory research, particularly in consumer behavior studies with second-order constructs (Hair et al., 2019).

To assess the distributional characteristics of the dataset, a normality test was performed using the WebPower online tool[1] as recommended by Feng et al. (2023). The results revealed deviations from normality, with Mardia's multivariate skewness at 11.274 ($p < 0.01$) and multivariate kurtosis at 234.633 ($p < 0.01$), both exceeding the standard thresholds of 3 and 10, respectively (Kline, 2018). These findings confirmed that the data were non-normally distributed. In such cases, PLS-SEM is especially appropriate as it does not require normally distributed data and can yield robust parameter estimates under such conditions.

## Common method bias assessment

Given that the data were collected from a single source using a self-administered questionnaire, the study employed the full collinearity test to assess CMB, as recommended by Kock (2015). All variance inflation factor (VIF) values ranged from 1.389 to 2.232, which are below the suggested threshold of 3.3 (see Table 3). These results indicate that CMB is not a major concern in this study.

1 https://webpower.psychstat.org/models/kurtosis/

TABLE 2 Demographic profile.

| Variable | Category | Frequency (*n*) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 225 | 47 |
| | Female | 254 | 53 |
| Age | 18–24 years | 185 | 38 |
| | 25–34 years | 131 | 27 |
| | 35–44 years | 94 | 20 |
| | 45–54 years | 22 | 5 |
| | 55 years and above | 47 | 10 |
| Education | Junior high school or below | 47 | 10 |
| | High school/Technical school | 28 | 6 |
| | College (Associate degree) | 77 | 16 |
| | Bachelor's degree | 273 | 57 |
| | Post Graduate degree or above | 54 | 11 |
| Occupation | Student | 177 | 37 |
| | Company employee | 97 | 20 |
| | Government/public institution staff | 60 | 13 |
| | Self-employed/E-commerce practitioner | 67 | 14 |
| | Agriculture/Forestry/Fishery worker | 15 | 3 |
| | Homemaker/Freelancer | 49 | 10 |
| | Retired | 14 | 3 |
| Region | North China | 72 | 15 |
| | Northeast China | 58 | 12 |
| | East China | 62 | 13 |
| | Central China | 61 | 12 |
| | South China | 168 | 35 |
| | Southwest China | 55 | 11 |
| | Northwest China | 4 | 1 |
| | Hong Kong/Macau/Taiwan | 3 | 1 |
| How often do you watch live streams of agricultural products? | Almost every day | 84 | 18 |
| | Several times a week | 90 | 19 |
| | Occasionally | 98 | 20 |
| | Rarely | 97 | 20 |
| | Only once or twice | 110 | 23 |
| Have you ever purchased products from a live stream featuring agricultural products? | Yes | 107 | 22% |
| | No | 372 | 78% |

## Assessment of the measurement model

Our study evaluated the reliability and validity of all reflective constructs in the measurement model. As shown in Table 3, all item loadings exceeded the threshold of 0.708, and the average variance extracted (AVE) values ranging from 0.683 to 0.876, which are above 0.50, supporting convergent validity (Hair et al., 2019). The values of Cronbach's alpha (0.788–0.929), and composite reliability (0.876–0.955) (Hair et al., 2019). Moreover, discriminant validity was evaluated using the heterotrait–monotrait (HTMT) ratio of correlations. Table 4 demonstrates that all HTMT values fell below the conservative threshold of 0.85 (Henseler et al., 2015), indicating satisfactory discriminant validity among constructs.

## Validating the higher-order construct

This study considers psychological engagement to be type II (i.e., reflective-formative) higher-order constructs. It composed of three first-order dimensions: attention, enthusiasm, and absorption. Following the two-stage approach suggested by Sarstedt et al. (2019), multicollinearity was assessed, and all VIF values were well below the

TABLE 3 Assessment of measurement model.

| Construct | Items | Loadings | Cronbach's alpha | Composite reliability | Average variance extracted (AVE) | Full collinearity |
|---|---|---|---|---|---|---|
| Credibility | C1 | 0.858 | 0.831 | 0.899 | 0.747 | 1.666 |
| | C2 | 0.853 | | | | |
| | C3 | 0.883 | | | | |
| Likability | L1 | 0.862 | 0.815 | 0.890 | 0.729 | 1.876 |
| | L2 | 0.851 | | | | |
| | L3 | 0.848 | | | | |
| Rural identity Salience | RIS1 | 0.909 | 0.879 | 0.925 | 0.805 | 2.232 |
| | RIS2 | 0.877 | | | | |
| | RIS3 | 0.904 | | | | |
| Production information | PI1 | 0.821 | 0.862 | 0.906 | 0.707 | 1.948 |
| | PI2 | 0.851 | | | | |
| | PI3 | 0.851 | | | | |
| | PI4 | 0.840 | | | | |
| Product quality | PQ1 | 0.883 | 0.840 | 0.903 | 0.757 | 2.058 |
| | PQ2 | 0.848 | | | | |
| | PQ3 | 0.880 | | | | |
| Cost-value ratio | CVR1 | 0.937 | 0.929 | 0.955 | 0.876 | 2.015 |
| | CVR2 | 0.935 | | | | |
| | CVR3 | 0.934 | | | | |
| Scene authenticity | SA1 | 0.849 | 0.788 | 0.876 | 0.702 | 1.536 |
| | SA2 | 0.842 | | | | |
| | SA3 | 0.822 | | | | |
| Scene transparency | ST1 | 0.831 | 0.888 | 0.918 | 0.690 | 2.044 |
| | ST2 | 0.837 | | | | |
| | ST3 | 0.834 | | | | |
| | ST4 | 0.827 | | | | |
| | ST5 | 0.824 | | | | |
| Attention | AT1 | 0.832 | 0.846 | 0.896 | 0.683 | 1.756 |
| | AT2 | 0.819 | | | | |
| | AT3 | 0.824 | | | | |
| | AT4 | 0.832 | | | | |
| Enthusiasm | EN1 | 0.852 | 0.885 | 0.921 | 0.744 | 1.755 |
| | EN2 | 0.872 | | | | |
| | EN3 | 0.860 | | | | |
| | EN4 | 0.865 | | | | |
| Absorption | AB1 | 0.818 | 0.863 | 0.907 | 0.709 | 1.583 |
| | AB2 | 0.859 | | | | |
| | AB3 | 0.838 | | | | |
| | AB4 | 0.851 | | | | |
| Information seeking | IS1 | 0.878 | 0.807 | 0.885 | 0.721 | 1.921 |
| | IS2 | 0.824 | | | | |
| | IS3 | 0.845 | | | | |

*(Continued)*

TABLE 3 (Continued)

| Construct | Items | Loadings | Cronbach's alpha | Composite reliability | Average variance extracted (AVE) | Full collinearity |
|---|---|---|---|---|---|---|
| Information sharing | ISH1 | 0.820 | 0.835 | 0.890 | 0.669 | 1.735 |
| | ISH2 | 0.803 | | | | |
| | ISH3 | 0.824 | | | | |
| | ISH4 | 0.823 | | | | |
| Responsible behavior | RB1 | 0.847 | 0.884 | 0.920 | 0.742 | 1.389 |
| | RB2 | 0.876 | | | | |
| | RB3 | 0.85 | | | | |
| | RB3 | 0.872 | | | | |
| Personal interaction | PEI1 | 0.840 | 0.908 | 0.931 | 0.730 | 1.826 |
| | PEI2 | 0.847 | | | | |
| | PEI3 | 0.872 | | | | |
| | PEI4 | 0.854 | | | | |
| | PEI5 | 0.860 | | | | |

3.3 threshold, ranging from 1.309 to 1.359, indicating no collinearity issues (Kock, 2015). As shown in Table 5, all outer weights were significant at the $p < 0.001$ level, supporting the structural validity of the second-order construct.

## Assessment of the structural model

The structural model was assessed by examining collinearity, path coefficients, effect sizes ($f^2$), explained variance ($R^2$), and predictive relevance ($Q^2$). As shown in Table 6, all VIF values ranged from 1.000 to 2.081, indicating that multicollinearity was not a concern (Hair et al., 2019). Subsequently, the significance and effect sizes of the hypothesized relationships were evaluated (see Table 6; Figure 2). Regarding streamer characteristics, both credibility ($\beta = 0.138$, $f^2 = 0.029$) and rural identity salience ($\beta = 0.181$, $f^2 = 0.038$) exerted significant positive effects on psychological engagement, providing support for H1a and H1c. In contrast, likability ($\beta = 0.030$, $f^2 = 0.001$) did not demonstrate a significant effect, hence H1b was not supported. For product characteristics, product information ($\beta = 0.128$, $f^2 = 0.021$), product quality ($\beta = 0.136$, $f^2 = 0.023$), and perceived cost value ratio ($\beta = 0.141$, $f^2 = 0.025$) all had significant positive effects on psychological engagement, thereby supporting H2a, H2b, and H2c. With respect to scene settings, perceived scene authenticity ($\beta = 0.117$, $f^2 = 0.022$) and scene transparency ($\beta = 0.149$, $f^2 = 0.030$) were both found to be significant predictors, confirming H3a and H3b. Collectively, these antecedents explained 59% of the variance in psychological engagement ($R^2 = 0.590$), suggesting substantial explanatory power.

With respect to the outcome variables, psychological engagement was found to significantly influence all four dimensions of customer value co-creation behavior. The strongest effects were observed for information seeking ($\beta = 0.583$, $f^2 = 0.514$) and personal interaction ($\beta = 0.515$, $f^2 = 0.360$), followed by information sharing ($\beta = 0.494$, $f^2 = 0.323$). A smaller but statistically significant effect was also found for responsible behavior ($\beta = 0.130$, $f^2 = 0.017$). These results provide empirical support for H4a, H4b, H4c, and H4d. The model explained 34% of the variance in information seeking, 24.4% in information sharing, 1.7% in responsible behavior, and 26.5% in personal interaction. Regarding predictive relevance ($Q^2$), all dependent variables demonstrated $Q^2$ values greater than zero (Geisser, 1974; Stone, 1974). Specifically, $Q^2$ values were 0.570 for psychological engagement, 0.339 for information seeking, 0.289 for information sharing, 0.043 for responsible behavior, and 0.331 for personal interaction, confirming the predictive relevance of the model.

# Discussion and implications

## Theoretical implications

This study set out to investigate how agricultural livestreams may facilitate a shift from passive viewing to active customer participation in value co-creation. Drawing on SCT, data were collected from 479 Chinese consumers with prior experience in agricultural livestreaming. The outcomes point to several theoretical implications as followed.

First, this study contributes to the extension of SCT by demonstrating that agricultural livestreams create a distinct mediated learning environment in which symbolic and relational cues substitute for direct sensory input. Consistent with Bandura's principle of triadic reciprocal determinism (Bandura, 1989, 2001), the findings show that environmental stimuli interact with cognitive and behavioral factors to shape psychological engagement. This supports Schunk and DiBenedetto's (2020) view that cognition and affect operate through mediated observation. The results are also consistent with prior SCT-based studies in digital commerce. For instance, Lim et al. (2024) found that emotional engagement mediated the relationship between presence and impulse buying in tourism livestreams. In agricultural livestreaming, viewers interpret verbal and visual cues to assess

TABLE 4 Discriminant validity test using HTMT criterion.

| Construct | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Absorption | | | | | | | | | | | | | | | |
| 2. Attention | 0.525 | | | | | | | | | | | | | | |
| 3. Cost-value ratio | 0.526 | 0.517 | | | | | | | | | | | | | |
| 4. Credibility | 0.426 | 0.531 | 0.484 | | | | | | | | | | | | |
| 5. Enthusiasm | 0.470 | 0.480 | 0.512 | 0.535 | | | | | | | | | | | |
| 6. Information Seeking | 0.475 | 0.575 | 0.510 | 0.522 | 0.565 | | | | | | | | | | |
| 7. Information sharing | 0.414 | 0.479 | 0.528 | 0.456 | 0.462 | 0.527 | | | | | | | | | |
| 8. Likability | 0.449 | 0.462 | 0.630 | 0.504 | 0.512 | 0.592 | 0.552 | | | | | | | | |
| 9. Personal interaction | 0.407 | 0.469 | 0.509 | 0.484 | 0.474 | 0.482 | 0.571 | 0.537 | | | | | | | |
| 10. Product quality | 0.562 | 0.549 | 0.617 | 0.590 | 0.552 | 0.550 | 0.452 | 0.647 | 0.495 | | | | | | |
| 11. Production information | 0.454 | 0.535 | 0.571 | 0.579 | 0.579 | 0.550 | 0.506 | 0.585 | 0.527 | 0.641 | | | | | |
| 12. Responsible behavior | 0.078 | 0.144 | 0.237 | 0.236 | 0.115 | 0.426 | 0.434 | 0.305 | 0.402 | 0.181 | 0.277 | | | | |
| 13. Rural identity Salience | 0.541 | 0.580 | 0.618 | 0.610 | 0.576 | 0.580 | 0.581 | 0.603 | 0.570 | 0.663 | 0.665 | 0.232 | | | |
| 14. Scene authenticity | 0.453 | 0.537 | 0.503 | 0.463 | 0.437 | 0.452 | 0.432 | 0.541 | 0.499 | 0.557 | 0.489 | 0.214 | 0.520 | | |
| 15. Scene Transparency | 0.496 | 0.585 | 0.602 | 0.521 | 0.493 | 0.641 | 0.556 | 0.525 | 0.570 | 0.594 | 0.569 | 0.293 | 0.610 | 0.543 | |

HTMT <0.85. HTMT: Heterotrait-monotrait ratio of correlations.

TABLE 5 Higher order construct assessment.

| Second-order construct | First-order components | VIF | Outer weights | *p*-values |
|---|---|---|---|---|
| Psychological engagement | Attention | 1.359 | 0.462 | $p < 0.001$ |
| | Enthusiasm | 1.309 | 0.483 | $p < 0.001$ |
| | Absorption | 1.354 | 0.325 | $p < 0.001$ |

credibility and ecological value, consistent with Li and Li (2024) findings on observational learning. By applying SCT to a rural commerce context, the study broadens its scope to agrifood domains. In doing so, the study responds to Bandura's (2012) call to explore behavioral adaptation in emerging media environments, confirming that symbolic cues can activate engagement and co-creation without direct physical experience.

Second, this study contributes to livestreaming research by integrating streamer, product, and scene-related cues into a unified framework for explaining psychological engagement. While previous studies have often examined these elements in isolation (Zhu et al., 2023; Peng et al., 2024; Yuan et al., 2025), the current model demonstrates their combined explanatory power. This integrated approach responds to Yuan et al. (2025), who called for investigating multiple cues simultaneously. The model accounts for 59% of the variance in psychological engagement, indicating strong explanatory strength. Notably, the findings highlight the importance of scene-related features, which remain underexplored in agricultural livestreaming contexts.

Third, this study advances understanding of how different types of streamer cues influence psychological engagement in agricultural livestreaming. Consistent with prior research (Banik et al., 2025), streamer credibility significantly predicted engagement (H1a supported), confirming that perceived expertise and trustworthiness are key observational cues that stimulate cognitive and emotional involvement (Guo et al., 2021; Shen et al., 2022). Notably, rural identity salience emerged as the strongest predictor among the streamer-related factors (H1c supported), suggesting that cultural embeddedness conveys symbolic meaning that enhances engagement. This finding quantitatively supports earlier qualitative observations (Yu and Zhang, 2022; Cheng et al., 2025). In contrast, likability showed no significant effect (H1b not supported), diverging from prior livestreaming research that emphasizes warmth and relatability (Xu et al., 2022; Liang et al., 2025). This unexpected finding suggests that agricultural livestreaming operates under distinct psychological mechanisms compared to entertainment or fashion contexts. The results might imply viewers evaluating agricultural products with high credence attributes appear to prioritize functional credibility and cultural authenticity over interpersonal warmth (Tian and Frank, 2024). The strong effects of rural identity salience ($\beta = 0.181$) and scene transparency ($\beta = 0.149$) support this interpretation, indicating a hierarchical cue processing where task-relevant authenticity signals supersede social–emotional attributes. The finding aligns

TABLE 6 Assessment of structural model.

| Relationship | Std. Beta | Std. Error | *t* | *p* | Confidence interval (bias corrected) | | VIF | $f^2$ | $R^2$ | $Q^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | LB | UB | | | | |
| H1a: Credibility - > Psychological engagement | 0.138 | 0.043 | | 0.001 | 0.064 | 0.206 | 1.593 | 0.029 | 0.590 | 0.570 |
| H1b: Likability - > Psychological engagement | 0.030 | 0.042 | 0.720 | 0.236 | −0.041 | 0.098 | 1.760 | 0.001 | | |
| H1c: Rural identity Salience - > Psychological engagement | 0.181 | 0.043 | 4.216 | 0.000 | 0.108 | 0.250 | 2.081 | 0.038 | | |
| H2a: Production information - > Psychological engagement | 0.128 | 0.043 | 2.982 | 0.001 | 0.056 | 0.195 | 1.863 | 0.021 | | |
| H2b: Product quality - > Psychological engagement | 0.136 | 0.046 | 2.964 | 0.002 | 0.060 | 0.211 | 1.983 | 0.023 | | |
| H2c: Cost-value ratio - > Psychological engagement | 0.141 | 0.043 | 3.249 | 0.001 | 0.068 | 0.210 | 1.935 | 0.025 | | |
| H3a: Scene authenticity - > Psychological engagement | 0.117 | 0.037 | 3.178 | 0.001 | 0.055 | 0.175 | 1.474 | 0.022 | | |
| H3b: Scene Transparency - > Psychological engagement | 0.149 | 0.042 | 3.546 | 0.000 | 0.079 | 0.217 | 1.793 | 0.030 | | |
| H4a: Psychological engagement - > Information Seeking | 0.583 | 0.033 | 17.908 | 0.000 | 0.525 | 0.633 | 1.000 | 0.514 | 0.340 | 0.339 |
| H4b: Psychological engagement - > Information sharing | 0.494 | 0.037 | 13.336 | 0.000 | 0.429 | 0.552 | 1.000 | 0.323 | 0.244 | 0.289 |
| H4c: Psychological engagement - > Responsible behavior | 0.130 | 0.050 | 2.589 | 0.005 | 0.048 | 0.204 | 1.000 | 0.017 | 0.017 | 0.043 |
| H4d: Psychological engagement - > Personal interaction | 0.515 | 0.035 | 14.716 | 0.000 | 0.452 | 0.568 | 1.000 | 0.360 | 0.265 | 0.331 |

with Wei and Xi (2024) result that streamer-product congruence matters more than personality in specialized contexts, and echoes Guo et al. (2021) evidence for competence-based trust formation in high-uncertainty purchases. This "credibility-over-charisma" pattern may be specific to contexts where product credence attributes dominate and viewers cannot directly verify quality claims, making identity-based trust more valuable than personality-based affinity. By confirming this, the study extends SCT by demonstrating how symbolic cues foster trust and engagement in low-sensory, rural livestreaming environments.

Fourth, this study reaffirms the theoretical importance of product characteristics as central environmental cues influencing psychological engagement in agricultural livestreaming. All three product-related variables showed significant effects on psychological engagement.

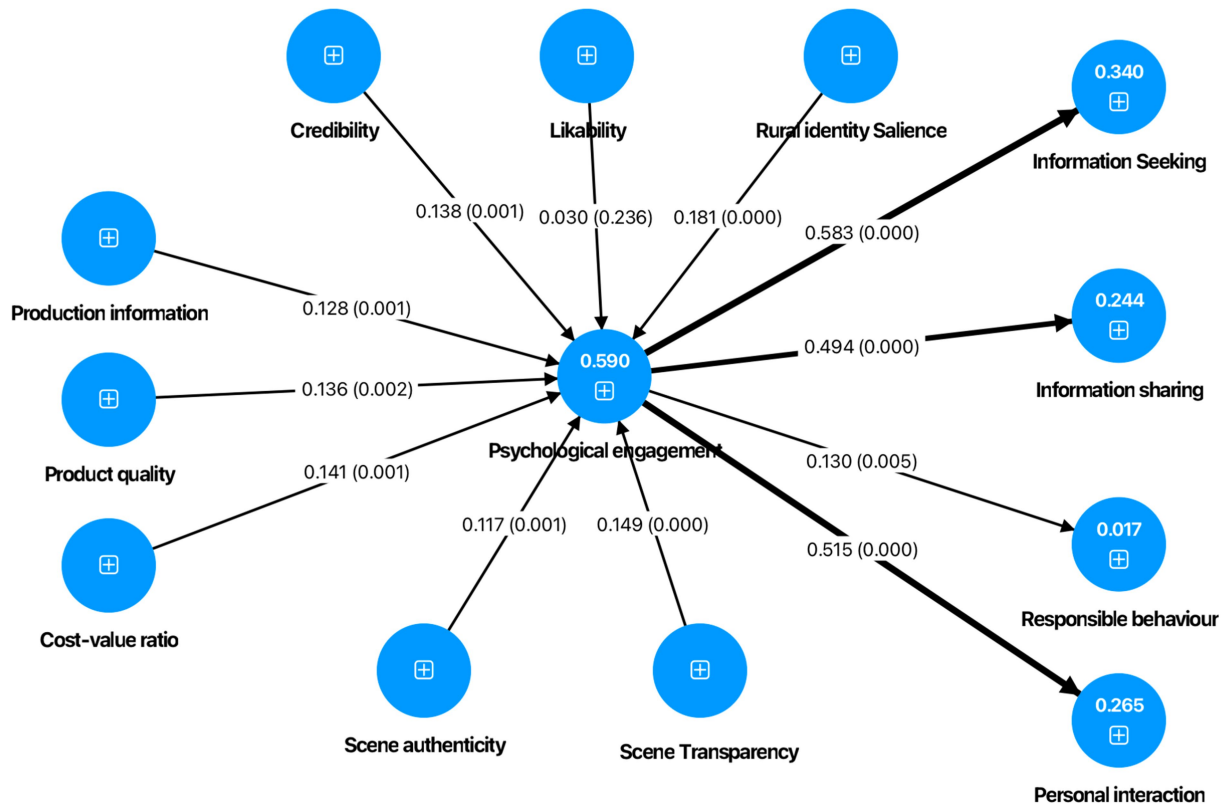


FIGURE 2
Assessment of structural model.

Specifically, product information ($\beta = 0.128$), product quality ($\beta = 0.136$), and cost value ratio ($\beta = 0.141$) were all supported, confirming H2a, H2b, and H2c. Among these, cost value ratio emerged as the strongest predictor, followed by product quality and product information. This result suggests that consumers are particularly responsive when pricing is perceived as fair in relation to product quality. The findings are consistent with prior research showing that transparent pricing and perceived fairness enhance trust and attentional focus in livestreaming commerce (Büyükdağ et al., 2020; Pan et al., 2022). In agricultural livestreaming, credible product information and price clarity promote attention, emotional involvement, and psychological engagement (Luo X. et al., 2024; Liu et al., 2025).

Fifth, this study advances theoretical understanding by showing that both perceived scene authenticity and scene transparency significantly enhance psychological engagement in agricultural livestreaming, thereby supporting H3a and H3b. Scene transparency ($\beta = 0.149$, $f^2 = 0.030$) had a stronger effect than scene authenticity ($\beta = 0.117$, $f^2 = 0.022$), indicating that clearly visualized production processes are more influential than ambient realism alone. The findings are consistent with Dong et al. (2023), who emphasize that unembellished streaming environments foster trust, and Yu et al. (2024), highlight visual novelty and immersive aesthetics in promoting co-creation. Unlike prior studies situated in tourism and leisure, this study shows that scene cues in agricultural livestreams also serve as cognitive and emotional triggers, particularly when transparency is emphasized. In doing so, the study extends SCT's environmental dimension from hedonic contexts to value-based settings. It further suggests that livestream scenes should be viewed not as passive backgrounds but as active information layers driving engagement and co-creation.

Sixth, this study reconceptualizes psychological engagement as a central explanatory mechanism that links livestream cues to customer value co-creation behaviors. All four hypothesized relationships were supported (H4a, H4b, H4c, H4d), indicating that engagement significantly predicts information seeking ($\beta = 0.583$), information sharing ($\beta = 0.494$), personal interaction ($\beta = 0.515$), and responsible behavior ($\beta = 0.130$). These findings reinforce SCT's emphasis on personal factors, particularly attentional and affective states, in shaping behavior through observational learning and internalization (Schunk and DiBenedetto, 2020). They also align with Fait et al. (2019) and Itani et al. (2020), who found that emotionally engaged users are more likely to engage in feedback and social endorsement due to social reinforcement. In contrast to studies that frame engagement as a passive emotional state or a precursor to purchase intention (Zhu et al., 2023), this study conceptualizes it as a dynamic processing condition that activates various participatory actions. Notably, engagement more strongly predicted information seeking and interaction than responsible behavior, suggesting a behavioral gradient in co-creation outcomes.

## Practical implications

This study offers several practical implications for agricultural livestreaming platforms, streamers, and policymakers. Each recommendation is directly derived from our empirical findings, with specific implementation strategies for different stakeholders. First, psychological engagement is a predictor of participatory behavior, particularly information seeking and personal interaction. Livestream content should therefore be structured to stimulate both cognitive attention and emotional resonance. Streamers are encouraged to adopt segmented content strategies, beginning with problem-based prompts, followed by localized explanations using simple data or visual aids, and concluding with emotionally rich storytelling. Specifically, streamers could: (1) start broadcasts with "daily farm check-ins" showing actual morning harvests or evening sorting activities; (2) demonstrate quality indicators through close-up shots while explaining selection criteria; and (3) share failure stories and weather challenges to build authenticity. Real-time demonstrations of production processes, such as harvesting or cleaning produce on site, can enhance immersion. Platforms may support these strategies by enabling modular narrative tools, incorporating interaction prompts, and offering analytics dashboards to monitor viewer engagement. For instance, platforms should develop "engagement heat maps" showing when viewers are most attentive, and provide automated prompts for streamers to initiate Q&A sessions during peak engagement moments.

Second, the strong influence of rural identity salience and scene authenticity highlights the importance of contextual representation. Streamers should emphasize their rural roots by using local dialects during product introductions (not throughout entire streams to maintain comprehensibility), referencing farming experiences such as "this technique was taught by my grandfather," and broadcasting from culturally or ecologically meaningful locations like actual fields during harvest season rather than studios. The non-significant effect of likability suggests streamers should prioritize demonstrating agricultural expertise over entertainment value. Platforms may enhance authenticity by providing location-tagging options with GPS verification, regional branding overlays showing local agricultural certification logos. Platforms should create "Verified Local Farmer" badges based on documentation review and implement "Farm-to-Screen" certification programs. Policymakers are encouraged to support these efforts by recognizing rural hosts as cultural representatives and investing in mobile-accessible infrastructure for underserved areas.

Third, given the effects of cost-value perception and scene transparency on engagement, value communication should prioritize what viewers can verify visually during the stream. Streamers should link price explanations to on-site visuals: show labor and inputs while speaking to their cost impact, use continuous and multi-angle shots of fields, sorting, and packing, and keep narration tightly aligned to what the camera shows. For instance, they could incorporate a simple on-screen price breakdown overlay synchronized with footage of hand-picking, grading, and cold-chain preparation. Platforms can facilitate this process by offering features such as a picture-in-picture or split-screen mode to display the anchor and a live field camera simultaneously, time-stamped scene chapters that viewers can revisit that viewers can revisit, an angle request button with easy multi-camera switching to maintain visual consistency, a lightweight on-site capture badge activated by continuous and unedited segments, and optional overlays that incorporate local weather or environmental readings to provide context for the scene. Standardized and user-friendly scene-based narrative templates can assist rural anchors in presenting value clearly, even without advanced editing skills.

Fourth, based on product information's significant effect, agricultural cooperatives could develop standardized information modules that individual farmers can customize. It should include harvest dates, storage methods, optimal consumption windows, and recipe suggestions. Streamers should clearly explain pricing in relation to ecological practices, production constraints, or sustainability attributes. Tools such as traceability QR codes, origin labels, and interactive infographics can help visualize these links. Platform developers may consider standardizing traceability content and offering easy-to-use templates that support rural users in conveying value effectively. For premium or certified products, aligning messaging with ethical and sustainable consumption narratives is essential. Given that 78% of engaged viewers hav not purchased, cooperatives should create "trial size" offerings specifically for livestream audiences to lower initial purchase barriers.

# Conclusion

This study examined how environmental cues in agricultural livestreaming, including streamer characteristics, product attributes, and scene features, shape psychological engagement and subsequent customer value co-creation. Based on SCT, the findings show that credibility, rural identity salience, informative content, perceived quality, cost value alignment, scene authenticity, and scene transparency all contribute to engagement. Streamer likability, however, did not show a significant effect. Rural identity and scene transparency were especially influential. Psychological engagement strongly predicted four co-creation behaviors, with information seeking and personal interaction emerging as the most responsive, highlighting engagement's role in driving participatory consumption.

## Limitations and further research

This study presents several limitations that offer directions for future research. First, the data were collected solely from Chinese viewers who had previously engaged with agricultural livestreams. While this reflects a relevant demographic in the context of China's rural revitalization, the generalizability of the findings remains limited. Comparative studies across countries and agricultural systems could assess whether rural identity salience and scene transparency function similarly elsewhere. Second, the cross-sectional design restricts understanding of how psychological engagement and co-creation behaviors evolve over time. Longitudinal studies are recommended to capture seasonal variation, user experience, or policy-driven campaign effects (Kang et al., 2021).

Third, our study primarily establishes the direct effects of livestreaming environmental cues on psychological engagement, providing a foundational understanding of these relationships. Future research could extend this framework by examining potential boundary conditions that moderate these effects. A limitation concerns unmodeled heterogeneity on the consumer side. Propensity to participate in value co-creation may vary with age, rural familiarity,

prior livestream experience, product knowledge, or sustainability orientation. The characteristics could condition the strength of the paths from livestream cues to psychological engagement and from engagement to participation. Future study can examine this by incorporating consumer characteristics as moderators in multi-group or moderated mediation designs, while keeping the current cue-based framework intact. Most notably, the null effect of streamer likability, contrasting with its significance in entertainment livestreaming literature, suggests that agricultural contexts may activate different psychological mechanisms. As our sample focused on streamers with rural identities (e.g., farmers and village officials), the strong effect of rural identity salience may be context-specific. Future research should systematically examine boundary conditions through multi-group analyses comparing: (1) farmer-streamers versus celebrity endorsers to test whether identity-product congruence or star power drives engagement differently (Gao et al., 2023), (2) high versus low interactivity settings, to establish when likability enhances rather than merely complements engagement formation (Kang et al., 2021).

Fourth, although psychological engagement was shown to predict co-creation behavior, its mediating role was not tested. Future research should examine whether engagement explains the link between livestream cues and co-creation outcomes. Fifth, the study did not investigate purchase intention. Despite evidence of engagement, many respondents (78%) had not completed transactions. Further research is needed to explore the relationship between co-creation and buying behavior. Sixth, platform-level influences such as recommendation systems or streamer incentives were not considered. Finally, agricultural products involve attributes such as freshness and perishability. Future work should examine how these product-specific concerns affect consumer judgment and co-creation.

## Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: data is collected from the research team. Requests to access these datasets should be directed to binyaoning@utm.my.

## Author contributions

BN: Data curation, Writing – review & editing, Visualization, Writing – original draft, Resources, Conceptualization, Funding acquisition, Formal analysis. RO: Writing – review & editing, Conceptualization, Supervision, Validation. YY: Writing – review & editing, Writing – original draft, Data curation, Conceptualization. BO: Writing – review & editing, Validation. BR: Writing – review & editing, Validation.

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## 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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## Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2025.1628385/full#supplementary-material

## References

Bandura, A. (1989). Human agency in social cognitive theory. *Am. Psychol.* 44, 1175–1184. doi: 10.1037/0003-066x.44.9.1175

Bandura, A. (2001). Social cognitive theory of mass communication. *Media Psychol.* 3, 265–299. doi: 10.1207/s1532785xmep0303_03

Bandura, A. (2012). "Going global with social cognitive theory: from prospect to paydirt" in Applied psychology. Eds. S. I. Donaldson, D. E. Berger, K. Pezdek. (New York, USA: Psychology Press), 53–79.

Banik, S., Giri, A., and Chatterjee, S. (2025). Antecedents and consequences of viewers' engagement toward vlogging. *J. Consum. Behav.* 24, 1249–1274. doi: 10.1002/cb.2467

Blasco-Arcas, L., Hernandez-Ortega, B. I., and Jimenez-Martinez, J. (2016). Engagement platforms: the role of emotions in fostering customer engagement and brand image in interactive media. *J. Serv. Theory Pract.* 26, 559–589. doi: 10.1108/JSTP-12-2014-0286

Brislin, R. W. (1970). Back-translation for cross-cultural research. *J. Cross-Cult. Psychol.* 1, 185–216. doi: 10.1177/135910457000100301

Bu, Y., Parkinson, J., and Thaichon, P. (2022). Influencer marketing: homophily, customer value co-creation behaviour and purchase intention. *J. Retail. Consum. Serv.* 66:102904. doi: 10.1016/j.jretconser.2021.102904

Büyükdağ, N., Soysal, A. N., and Kitapci, O. (2020). The effect of specific discount pattern in terms of price promotions on perceived price attractiveness and purchase intention: an experimental research. *J. Retail. Consum. Serv.* 55:102112. doi: 10.1016/j.jretconser.2020.102112

Chen, C.-D., Zhao, Q., and Wang, J.-L. (2022). How livestreaming increases product sales: role of trust transfer and elaboration likelihood model. *Behav. Inf. Technol.* 41, 558–573. doi: 10.1080/0144929X.2020.1827457

Cheng, X., Xu, Y., Yang, B., and Liu, Y. (2025). Understanding streamers' intention to live stream in the context of rural live streaming commerce: a mixed-methods study. *Internet Res.* 2. doi: 10.1108/INTR-08-2023-0715

Chou, C. Y., Chen, J., and Lin, S. (2022). Value cocreation in livestreaming and its effect on consumer-simulated experience and continued use intention. *Int. J. Consum. Stud.* 46, 2183–2199. doi: 10.1111/ijcs.12777

Chuah, S. H.-W., El-Manstrly, D., Tseng, M.-L., and Ramayah, T. (2020). Sustaining customer engagement behavior through corporate social responsibility: the roles of environmental concern and green trust. *J. Clean. Prod.* 262:121348. doi: 10.1016/j.jclepro.2020.121348

Claffey, E., and Brady, M. (2019). An empirical study of the impact of consumer emotional engagement and affective commitment in firm-hosted virtual communities. *J. Mark. Manag.* 35, 1047–1079. doi: 10.1080/0267257X.2019.1601125

De Oliveira Santini, F., Ladeira, W. J., Pinto, D. C., Herter, M. M., Sampaio, C. H., and Babin, B. J. (2020). Customer engagement in social media: a framework and meta-analysis. *J. Acad. Mark. Sci.* 48, 1211–1228. doi: 10.1007/s11747-020-00731-5

Dong, Y., Li, Y., Hua, H.-Y., and Li, W. (2023). Perceived tourism authenticity on social media: the consistency of ethnic destination endorsers. *Tour. Manag. Perspect.* 49:101176. doi: 10.1016/j.tmp.2023.101176

Fait, M., Scorrano, P., Mastroleo, G., Cillo, V., and Scuotto, V. (2019). A novel view on knowledge sharing in the Agri-food sector. *J. Knowl. Manag.* 23, 953–974. doi: 10.1108/JKM-09-2018-0572

Faul, F., Erdfelder, E., Buchner, A., and Lang, A.-G. (2009). Statistical power analyses using G*power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. doi: 10.3758/BRM.41.4.1149

Feng, Z., Al Mamun, A., Masukujjaman, M., and Yang, Q. (2023). Modeling the significance of advertising values on online impulse buying behavior. *Humanit. Soc. Sci. Commun.* 10:728. doi: 10.1057/s41599-023-02231-7

Fu, S., Hu, X., Zhang, C., and Li, Z. (2025). A study on the influence of production and environmental information transparency on online consumers' purchase intention of green agricultural products. *Br. Food J.* 127, 1461–1479. doi: 10.1108/BFJ-09-2024-0889

Gao, W., Jiang, N., and Guo, Q. (2023). How do virtual streamers affect purchase intention in the live streaming context? A presence perspective. *J. Retail. Consum. Serv.* 73:103356. doi: 10.1016/j.jretconser.2023.103356

Gao, K., and Qiao, G. (2025). How social capital drives farmers' multi-stage E-commerce participation: evidence from inner Mongolia, China. *Agriculture* 15:501. doi: 10.3390/agriculture15050501

Geisser, S. (1974). A predictive approach to the random effect model. *Biometrika* 61, 101–107. doi: 10.1093/biomet/61.1.101

Goel, P., and Garg, A. (2025). Virtual personalities, real bonds: anthropomorphised virtual influencers' impact on trust and engagement. *J. Consum. Mark.* 42, 431–447. doi: 10.1108/JCM-05-2024-6915

Gu, Y., Cheng, X., and Shen, J. (2023). Design shopping as an experience: exploring the effect of the live-streaming shopping characteristics on consumers' participation intention and memorable experience. *Inf. Manag.* 60:103810. doi: 10.1016/j.im.2023.103810

Guo, L., Hu, X., Lu, J., and Ma, L. (2021). Effects of customer trust on engagement in live streaming commerce: mediating role of swift guanxi. *Internet Res.* 31, 1718–1744. doi: 10.1108/INTR-02-2020-0078

Guo, H., Sun, X., Pan, C., Xu, S., and Yan, N. (2022). The sustainability of fresh agricultural produce live broadcast development: influence on consumer purchase intentions based on live broadcast characteristics. *Sustainability* 14:7159. doi: 10.3390/su14127159

Guo, Y., Zhang, K., and Wang, C. (2022). Way to success: understanding top streamer's popularity and influence from the perspective of source characteristics. *J. Retail. Consum. Serv.* 64:102786. doi: 10.1016/j.jretconser.2021.102786

Hair, J. F., Risher, J. J., Sarstedt, M., and Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* 31, 2–24. doi: 10.1108/EBR-11-2018-0203

Han, T., Han, J., Liu, J., and Li, W. (2024). Effect of emotional factors on purchase intention in live streaming marketing of agricultural products: a moderated mediation model. *PLoS One* 19:e0298388. doi: 10.1371/journal.pone.0298388

Henseler, J., Ringle, C. M., and Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* 43, 115–135. doi: 10.1007/s11747-014-0403-8

Hinton, J. D. X., Koc, Y., De La Piedad Garcia, X., Kaufmann, L. M., and Anderson, J. R. (2024). Chronic and contextual identity salience: assessing dual-dimensional salience with the identity salience questionnaire (ISQ). *Self Identity* 23, 351–380. doi: 10.1080/15298868.2024.2379841

Hua, Y., Wang, D., Luo, X., Chang, F.-K., and Xie, Y. (2023). Discovering the juxtaposed affordances in digitally transformed live streaming e-commerce: a mixed-methods study from a vicarious learning perspective. *Eur. J. Inf. Syst.* 33, 469–500. doi: 10.1080/0960085X.2023.2178978

Hunt, S. D., Sparkman, R. D., and Wilcox, J. B. (1982). The pretest in survey research: issues and preliminary findings. *J. Mark. Res.* 19, 269–273. doi: 10.1177/002224378201900211

Itani, O. S., El Haddad, R., and Kalra, A. (2020). Exploring the role of extrovert-introvert customers' personality prototype as a driver of customer engagement: does relationship duration matter? *J. Retail. Consum. Serv.* 53:101980. doi: 10.1016/j.jretconser.2019.101980

Kang, K., Lu, J., Guo, L., and Li, W. (2021). The dynamic effect of interactivity on customer engagement behavior through tie strength: evidence from live streaming commerce platforms. *Int. J. Inf. Manag.* 56:102251. doi: 10.1016/j.ijinfomgt.2020.102251

Kim, M., and Kim, H.-M. (2022). What online game spectators want from their twitch streamers: flow and well-being perspectives. *J. Retail. Consum. Serv.* 66:102951. doi: 10.1016/j.jretconser.2022.102951

Kline, R. B. (2018). Response to Leslie Hayduk's review of principles and practice of structural equation modeling, 4th edition. *Can. Stud. Popul.* 45:188. doi: 10.25336/csp29418

Kock, N. (2015). Common method bias in PLS-SEM: a full collinearity assessment approach. *Int. J. e-Collab.* 11, 1–10. doi: 10.4018/ijec.2015100101

Li, J., and Li, X. (2024). Coopetition in social commerce: what influences livestreaming knowledge sharing in agricultural clusters? *Electron. Commer. Res. Appl.* 64:101383. doi: 10.1016/j.elerap.2024.101383

Li, J., Tao, Z., and Aisihaer, N. (2024). Effect of visualization of production process on consumers' purchase intentions in farmer-assisted livestreaming. *Asia Pac. J. Mark. Logist.* 36, 2577–2592. doi: 10.1108/APJML-08-2023-0745

Liang, J., Han, C. M., and Nam, H. (2025). Effects of source factors for creating swift guanxi in live stream e-commerce in China. *Asia Pac. J. Mark. Logist.* 4. doi: 10.1108/APJML-07-2024-0859

Lim, J. S., Choe, M.-J., Zhang, J., and Noh, G.-Y. (2020). The role of wishful identification, emotional engagement, and parasocial relationships in repeated viewing of live-streaming games: a social cognitive theory perspective. *Comput. Human Behav.* 108:106327. doi: 10.1016/j.chb.2020.106327

Lim, X.-J., Luo, X., Cheah, J.-H., Tan, K.-L., and Hall, C. M. (2024). Unveiling impulse buying patterns in travel live-streaming through the lens of social cognitive theory. *J. Vacat. Mark.* 10. doi: 10.1177/13567667241258280

Liu, H., and Tan, K. H. (2023). The viewer value co-creation process on sports live streaming platforms. *Ind. Manag. Data Syst.* 123, 1523–1547. doi: 10.1108/imds-04-2022-0251

Liu, Y., Zhang, M., Hu, M., and Qiao, T. (2025). How multi-actor resources create value for live streaming platforms: the mediating role of engaged spectators. *Serv. Ind. J.* 45, 526–555. doi: 10.1080/02642069.2024.2312352

Luo, X., Cheah, J.-H., Hollebeek, L. D., and Lim, X.-J. (2024). Boosting customers' impulsive buying tendency in live-streaming commerce: the role of customer engagement and deal proneness. *J. Retail. Consum. Serv.* 77:103644. doi: 10.1016/j.jretconser.2023.103644

Luo, L., Xu, M., and Zheng, Y. (2024). Informative or affective? Exploring the effects of streamers' topic types on user engagement in live streaming commerce. *J. Retail. Consum. Serv.* 79:103799. doi: 10.1016/j.jretconser.2024.103799

Lv, J., Cao, C., Xu, Q., Ni, L., Shao, X., and Shi, Y. (2022). How live streaming interactions and their visual stimuli affect users' sustained engagement behaviour—a comparative experiment using live and virtual live streaming. *Sustainability* 14:8907. doi: 10.3390/su14148907

Muhammad, S. S., Dey, B. L., Kamal, M. M., and Syed Alwi, S. F. (2021). Consumer engagement with social media platforms: a study of the influence of attitudinal components on cutting edge technology adaptation behaviour. *Comput. Hum. Behav.* 121:106802. doi: 10.1016/j.chb.2021.106802

Onofrei, G., Filieri, R., and Kennedy, L. (2022). Social media interactions, purchase intention, and behavioural engagement: the mediating role of source and content factors. *J. Bus. Res.* 142, 100–112. doi: 10.1016/j.jbusres.2021.12.031

Palma, F. C., Trimi, S., and Hong, S.-G. (2019). Motivation triggers for customer participation in value co-creation. *Serv. Bus.* 13, 557–580. doi: 10.1007/s11628-018-00395-w

Pan, H., Liu, Z., and Ha, H.-Y. (2022). Perceived price and trustworthiness of online reviews: different levels of promotion and customer type. *Int. J. Contemp. Hosp. Manag.* 34, 3834–3854. doi: 10.1108/IJCHM-12-2021-1524

Peng, X., Ren, J., and Guo, Y. (2024). Enhance consumer experience and product attitude in E-commerce live streaming: based on the environmental perspective. *Ind. Manag. Data Syst.* 124, 319–343. doi: 10.1108/IMDS-12-2022-0743

Prahalad, C. K., and Ramaswamy, V. (2004). Co-creation experiences: the next practice in value creation. *J. Interact. Mark.* 18, 5–14. doi: 10.1002/dir.20015

Pu, B., Zhou, Q., Phau, I., and Zhu, S. (2025). Examining the influence of streamer source characteristics on viewers' continuous viewing intentions in tourism live-streaming: a SEM and fsQCA approach. *Asia Pac. J. Tourism Res.* 30, 437–452. doi: 10.1080/10941665.2025.2454236

Qin, F., Le, W., Zhang, M., and Deng, Y. (2023). How perceived attributes of livestreaming commerce influence customer engagement: a social support perspective. *J. Serv. Theory Pract.* 33, 1–22. doi: 10.1108/JSTP-01-2022-0022

Reppmann, M., Harms, S., Edinger-Schons, L. M., and Foege, J. N. (2024). Activating the sustainable consumer: the role of customer involvement in corporate sustainability. *J. Acad. Mark. Sci.* 53, 310–340. doi: 10.1007/s11747-024-01036-7

Roy, S. K., Gruner, R. L., and Guo, J. (2022). Exploring customer experience, commitment, and engagement behaviours. *J. Strateg. Mark.* 30, 45–68. doi: 10.1080/0965254X.2019.1642937

Sarstedt, M., Hair, J. F., Cheah, J.-H., Becker, J.-M., and Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australas. Mark. J.* 27, 197–211. doi: 10.1016/j.ausmj.2019.05.003

Saunders, M., Lewis, P., and Thornhill, A. (2009). Research methods for business students. Harlow, United Kingdom: Pearson Education.

Sawmong, S. (2022). Examining the key factors that drives live stream shopping behavior. *Emerg. Sci. J.* 6, 1394–1408. doi: 10.28991/ESJ-2022-06-06-011

Schneider, S., Beege, M., Nebel, S., Schnaubert, L., and Rey, G. D. (2022). The cognitive-affective-social theory of learning in digital environments (CASTLE). *Educ. Psychol. Rev.* 34, 1–38. doi: 10.1007/s10648-021-09626-5

Schunk, D. H., and DiBenedetto, M. K. (2020). Motivation and social cognitive theory. *Contemp. Educ. Psychol.* 60:101832. doi: 10.1016/j.cedpsych.2019.101832

Sereenonchai, S., and Arunrat, N. (2024). Communication strategies for sustainable urban agriculture in Thailand. *Sustainability* 16:10898. doi: 10.3390/su162410898

Shen, H., Zhao, C., Fan, D. X. F., and Buhalis, D. (2022). The effect of hotel livestreaming on viewers' purchase intention: exploring the role of parasocial interaction and emotional engagement. *Int. J. Hosp. Manag.* 107:103348. doi: 10.1016/j.ijhm.2022.103348

Soares, R., Liu, J., Zhang, T., Lu, C., and Zhong, Y. (2024). How does credibility matter? Proposing and validating a framework for the credibility of live streamers in the gaming industry. *Serv. Mark. Q.* 45, 83–104. doi: 10.1080/15332969.2023.2298609

Song, S., Yao, X., Zhao, Y. C., and Ba, Z. (2024). Get inspired and pay for the goods: an investigation of customer inspiration and purchase intention in livestream shopping. *J. Retail. Consum. Serv.* 78:103750. doi: 10.1016/j.jretconser.2024.103750

Stone, M. (1974). Cross-validatory choice and assessment of statistical predictions. *J. R. Stat. Soc. Ser. B Methodol.* 36, 111–147. doi: 10.1111/j.2517-6161.1974.tb00994.x

Tian, Y., and Frank, B. (2024). Optimizing live streaming features to enhance customer immersion and engagement: a comparative study of live streaming genres in China. *J. Retail. Consum. Serv.* 81:103974. doi: 10.1016/j.jretconser.2024.103974

Ting, D. H., Abbasi, A. Z., and Ahmed, S. (2021). Examining the mediating role of social interactivity between customer engagement and brand loyalty. *Asia Pac. J. Mark. Logist.* 33, 1139–1158. doi: 10.1108/APJML-10-2019-0576

Vargo, S. L., Maglio, P. P., and Akaka, M. A. (2008). On value and value co-creation: a service systems and service logic perspective. *Eur. Manag. J.* 26, 145–152. doi: 10.1016/j.emj.2008.04.003

Wang, M., and Fan, X. (2021). An empirical study on how livestreaming can contribute to the sustainability of green Agri-food entrepreneurial firms. *Sustainability* 13:12627. doi: 10.3390/su132212627

Wang, Y., Fang, L., and Pan, J. (2024). The antecedents of customer satisfaction in the live-streaming commerce of green agricultural products. *PLoS One* 19:e0305527. doi: 10.1371/journal.pone.0305527

Wang, P., and Huang, Q. (2023). Digital influencers, social power and consumer engagement in social commerce. *Internet Res.* 33, 178–207. doi: 10.1108/INTR-08-2020-0467

Wang, L., Zhang, R.-S., and Zhang, C.-X. (2024a). Live streaming e-commerce platform characteristics: influencing consumer value co-creation and co-destruction behavior. *Acta Psychol.* 243:104163. doi: 10.1016/j.actpsy.2024.104163

Wang, L., Zhu, H., Li, X., and Zhao, Y. (2024b). Formation mechanism of user stickiness in live e-commerce: the hybrid PLS-SEM and ANN approach. *Ind. Manag. Data Syst.* 124, 1234–1262. doi: 10.1108/IMDS-04-2023-0231

Wei, K., and Xi, W. (2024). Ceo vs. celebrity: the effect of streamer types on consumer engagement in brands' self-built live-streaming. *J. Res. Interact. Mark.* 18, 631–647. doi: 10.1108/JRIM-02-2023-0045

Xu, Q., Kim, H., and Billings, A. C. (2022). Let's watch live streaming: how streamer credibility influences brand attitude in esports streamer marketing. *Commun. Sport* 10, 271–290. doi: 10.1177/21674795211067819

Xu, X., Wu, J.-H., and Li, Q. (2020). What drives consumer shopping behavior in live streaming commerce? *J. Electron. Commer. Res.* 21, 144–167.

Ye, X., Batool, H., and Huang, S.-Z. (2023). The effect of e-commerce livestreaming services on customer loyalty: a test of the chain mediation model. *J. Innov. Entrep.* 12:41. doi: 10.1186/s13731-023-00310-2

Ye, X.-M., Batool, H., and Huang, S.-Z. (2023). The effect of physical cues on customer loyalty: based on the mediating effect of customer engagement and value co-creation. *Emerg. Sci. J.* 7, 1332–1348. doi: 10.28991/esj-2023-07-04-020

Yi, Y., and Gong, T. (2013). Customer value co-creation behavior: scale development and validation. *J. Bus. Res.* 66, 1279–1284. doi: 10.1016/j.jbusres.2012.02.026

Yu, J., Xie, C., and Huang, S. (2024). Value co-creation in live streaming through tourism scenes: a contextual marketing perspective. *Internet Res.* 4. doi: 10.1108/intr-05-2023-0362

Yu, Z., and Zhang, K. (2022). The determinants of purchase intention on agricultural products via public-interest live streaming for farmers during COVID-19 pandemic. *Sustainability* 14:13921. doi: 10.3390/su142113921

Yuan, C., Yin, Y., Zhang, Z., Wang, S., and Moon, H. (2025). The influence of perceived streamer characteristics and product characteristics on consumer behavior inertia in livestreaming contexts. *Asia Pac. J. Mark. Logist.* 37, 594–612. doi: 10.1108/APJML-01-2024-0008

Zhang, S., Huang, C., Li, X., and Ren, A. (2022). Characteristics and roles of streamers in e-commerce live streaming. *Serv. Ind. J.* 42, 1001–1029. doi: 10.1080/02642069.2022.2068530

Zhang, Y., and Xu, Q. (2024). Consumer engagement in live streaming commerce: value co-creation and incentive mechanisms. *J. Retail. Consum. Serv.* 81:103987. doi: 10.1016/j.jretconser.2024.103987

Zhao, K., Hu, Y., Hong, Y., and Westland, J. C. (2019). Understanding characteristics of popular streamers on live streaming platforms: evidence from twitch.tv. *JAIS Forthcoming.* doi: 10.2139/ssrn.3388949

Zheng, S., Lyu, X., Wang, J., and Wachenheim, C. (2023). Enhancing sales of green agricultural products through live streaming in China: what affects purchase intention? *Sustainability* 15:5858. doi: 10.3390/su15075858

Zhu, P., Liu, Z., Li, X., Jiang, X., and Zhu, M. X. (2023). The influences of livestreaming on online purchase intention: examining platform characteristics and consumer psychology. *Ind. Manag. Data Syst.* 123, 862–885. doi: 10.1108/IMDS-07-2022-0430