



Optimizing the Impact of Virtual Presence on Live Streaming Consumer Behavior

Deng Jing¹, Rosita Binti Mohd Tajuddin, Shaliza Mohd Shariff, Ren Benhui

College of Creative Arts, University Technology Mara (UiTM), 40450 Shah Alam, Malaysia

Abstract

One of the core advantages of live-streaming e-commerce lies in its ability to provide consumers with real-time demonstrations and interactive experiences, generating a strong sense of virtual presence. However, optimizing this virtual presence is a crucial strategy influencing positive consumer behavior. In this dynamic environment, employing literature analysis and case studies, we explore the intrinsic factors of virtual presence, categorizing them into four dimensions: live streamer, streaming assistant, consumer, and virtual environment. From the live streamer's perspective, building a strong IP (Intellectual Property) and fostering deep interaction; from the streaming assistant's perspective, seamless collaboration with the anchor and real-time interaction with users; from the consumer's perspective, encouraging user-generated content and sharing, gamified interactions; and from the virtual environment perspective: comprehensive presentation and technology-enabled visual enhancements. By optimizing each dimension of virtual presence, the aim to enhance consumer engagement, immersion, and entertainment, foster social interaction and community development, and influence positive behaviors such as purchase intent.

Keywords: Virtual Presence, Live E-Commerce, Consumer Behavior

Introduction

The internet and digital technology have ushered in a new communication, connectivity, and commerce era. Against the backdrop of the rapid development of international e-commerce, live-streaming e-commerce has emerged as a significant force in the global e-commerce landscape, seamlessly integrating real-time video streaming and online shopping dynamics (Wydymus, 2023). Consequently, major e-commerce platforms vigorously invest in live streaming, providing brands, influencers, and content creators a unique opportunity to establish connections with users, showcase products, engage in interactive dialogues, and influence consumer behavior.

The interactivity of live streaming empowers users with real-time participation and immediate feedback, creating a sense of presence and interactive experience in a virtual environment. The virtual presence in live streaming enhances user behavior and profoundly impacts purchasing decisions (Ming et al., 2021), ultimately contributing to significant success for brands in the digital realm.

Previous research on live-streaming e-commerce has often focused on external factors, such as exploring factors influencing enterprise live marketing (Ho et al., 2022), the traits of anchors (J. Chen & Liao, 2022), visual imagery of live spaces (Tsai, 2022), and communication strategies (Lv et al., 2022). However, more analysis of the core internal factors within live streaming that influence consumer behavior must be done. The unique appeal of rapidly popular live marketing lies in its ability to create a virtual presence. It breaks the limitations of physical space, allowing consumers to transcend their existence and instead develop a sense of social presence in virtual space. This provides a lifelike experience, offering an exciting collective consumer atmosphere (Ye et al., 2020; Yu-Qi,

¹ Corresponding Author, College of Creative Arts, University Technology Mara (uitm), 40450 Shah Alam, Malaysia.
E-mail: 2022116543@student.uitm.edu.my



2018). Therefore, this paper aims to discuss the impact of optimizing virtual presence on consumer purchasing behavior, drawing insights from the literature on virtual presence.

The concept of virtual presence

The exploration of virtual presence began with Slater & Wilbur (1997), who introduced the concept of presence. Subsequently, Schubert et al. (1999) delved into the study of presence in virtual environments. Building on this foundation, Lombard et al. (2000) emphasized that presence extends beyond physical environments and can be experienced in virtual settings, coining the term "virtual presence" to refer specifically to the perceptual experience within mediated or virtual environments. In recent years, with the continuous evolution of virtual reality (VR), augmented reality (AR), and other immersive technologies, there has been a growing focus on virtual presence within live streaming (Huang et al., 2023). In live-streaming e-commerce, virtual presence implies that consumers no longer exist independently but generate a sense of social presence in virtual space by breaking the constraints of physical space (Melo et al., 2022). This sensation immerses individuals, fostering a sense of belonging and immersion through online interactive behaviors. As consumers enjoy an engaging shopping experience, they not only indulge in rich shopping experiences but also establish more interpersonal connections, creating an exciting collective atmosphere for consumer engagement (Haimson & Tang, 2017; Wohn et al., 2018). Scholars' research on virtual presence in live-streaming e-commerce is crucial, providing valuable insights into understanding consumer behavior and live marketing strategies.

Regarding the nuanced dimensions of virtual presence, an in-depth analysis of the literature on virtual presence in live streaming reveals diverse perspectives among scholars. Witmer & Singer (1998) proposed three dimensions for understanding virtual presence: spatial presence (sensation in physical space), social presence (feeling together with others), and self-presence (self-identity in a virtual environment). Bulu (2012) expanded on this by introducing place presence, social presence, and co-presence. Lee & Park (2014) subdivided virtual presence into distant and social presence. Chen D. & Wang (2022) segmented social presence within virtual presence into awareness presence, emotional presence, and cognitive presence, confirming that these dimensions can evoke different consumer value perceptions and behavioral responses in the context of mobile online shopping environments. Ming et al. (2021) categorized social presence in live streaming into four dimensions: social presence on the platform, audience's social presence, anchor's social presence, and remote social presence. These research perspectives contribute to a deeper understanding of the essence of virtual presence and provide rich dimensions for comprehending consumer behaviors and reactions in a live-streaming environment, laying a comprehensive foundation for the marketing field.

In conclusion, while scholars have made significant strides in the study of virtual presence, there is an urgent need for in-depth research on the impact of virtual presence on user attitudes and behaviors within the emerging and challenging field of live-streaming e-commerce. Studies by Bao & Gong (2021;2022) demonstrate that anchors act as information conveyors in live streaming, while streaming assistants serve as external objective presences during influencer broadcasts, assisting anchors in conveying information, answering questions, enlivening the atmosphere, and facilitating consumer interaction. As communication between anchors and consumers often occurs through bullet comments, the live broadcast atmosphere is prone to becoming dull without streaming assistants engaging in vocal interactions and various assistance tasks. Therefore, building on previous research, especially the work of Ming et al. (2021), this paper, from the perspective of consumer perception, categorizes virtual presence in live-streaming e-commerce into four dimensions: anchor-dominated virtual presence, streaming assistant-assisted virtual presence, consumer interactive virtual presence, and virtual environment creation presence. The specific relationships are illustrated in Figure 1.

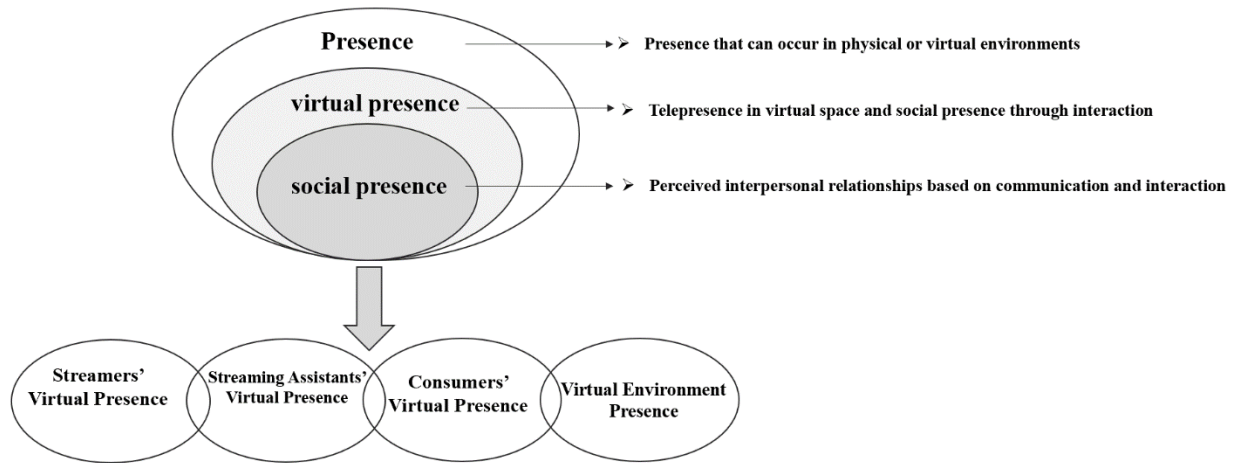


Figure 1 Connotation and extension of virtual presence

The Impact of Virtual Presence on Consumer Behavior in Live-Streaming E-Commerce.

As an emerging form within the e-commerce sector, live-streaming e-commerce in China has gained prominence globally in recent years. According to the 2022-2023 China Live-Streaming E-Commerce Industry Operation Big Data Analysis and Trend Research Report by IiMedia Research(2022), as illustrated in Figure 2, the market size of live-streaming e-commerce in China exhibited a significant upward trend from 2020 to 2021. This growth trajectory is anticipated to continue over the next four years. Notably, 2022 is considered the pivotal year for China's live-streaming e-commerce, with the market size expected to surpass 100 billion yuan, reflecting a staggering year-on-year growth rate of 210%. However, forecasts indicate a rapid decline in the year-on-year growth rate in subsequent years, projected to decrease to 60% by 2025. This data underscores the substantial impact of the evolving market, driven by continuous development and intense competition in the live-streaming sector, on various consumer behaviors, including shopping decisions. Consequently, live-streaming enterprises need to pay closer attention to consumer demands and behavioral trends when formulating strategies and marketing approaches to adapt to the market's evolution.

Scale and Forecast of China's live e-commerce market

Scale and Forecast of China's Live E-Commerce Market from 2022 to 2025

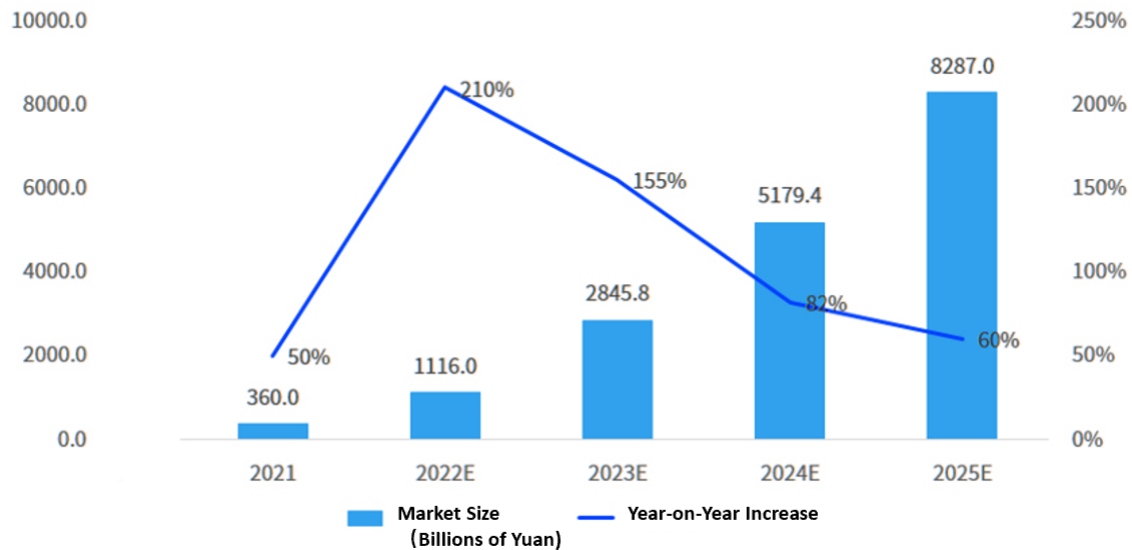


Figure 2 Scale and Forecast of China's Live E-Commerce Market from 2022 to 2025

Live-streaming e-commerce, with its unique communication approach and interactivity, has captured the attention and participation of many consumers. In this fiercely competitive and diverse market environment, virtual presence has become a key factor influencing live-streaming e-commerce's success. However, the mechanisms through which virtual presence affects consumer behavior in live streaming have yet to be thoroughly researched and elucidated. Therefore, investigating the impact of virtual presence on consumer behavior in live streaming is imperative.

A literature search on the Web of Science used the keywords "virtual presence" and "consumer behavior," yielding 127 papers on virtual presence and consumer behavior. After further excluding papers not closely related to the topic, a final selection of 66 papers was made. These papers are expected to provide necessary theoretical and empirical support for an in-depth study of the application of virtual presence in fashion-oriented live-streaming e-commerce.

Through keyword analysis using VOS viewer software, as depicted in Figure 3, it was observed that although the search term was "virtual presence," the keywords "virtual reality" and "social presence" appeared more frequently. This suggests that research on virtual presence needs to delve into the concepts of "virtual reality" and "social presence." This finding aligns precisely with the definition and analysis of virtual presence in the literature review section. The integration of social presence has significantly impacted the study of virtual presence, laying a crucial foundation for live-streaming e-commerce to quickly occupy customers' minds, gain favor, and establish a strong connection.

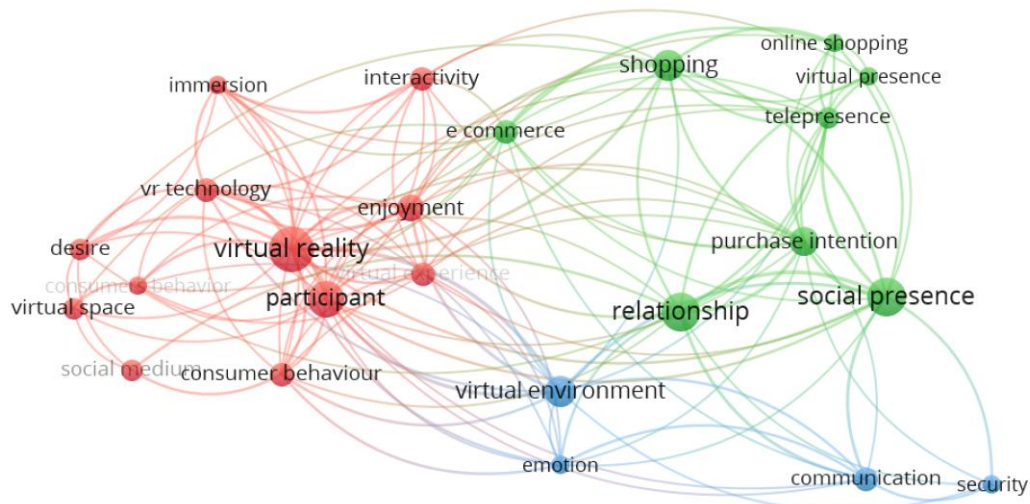


Figure 3 Key Terms on the Impact of Virtual Presence on Consumer Behavior

By extracting the keywords "virtual presence" and "consumer behavior," as illustrated in Figure 4, it is evident that virtual presence profoundly impacts consumer perception and behavior in live-streaming e-commerce. Specifically, the key aspects include engagement, interactivity, community relationships, immersion, entertainment, and purchase intention.

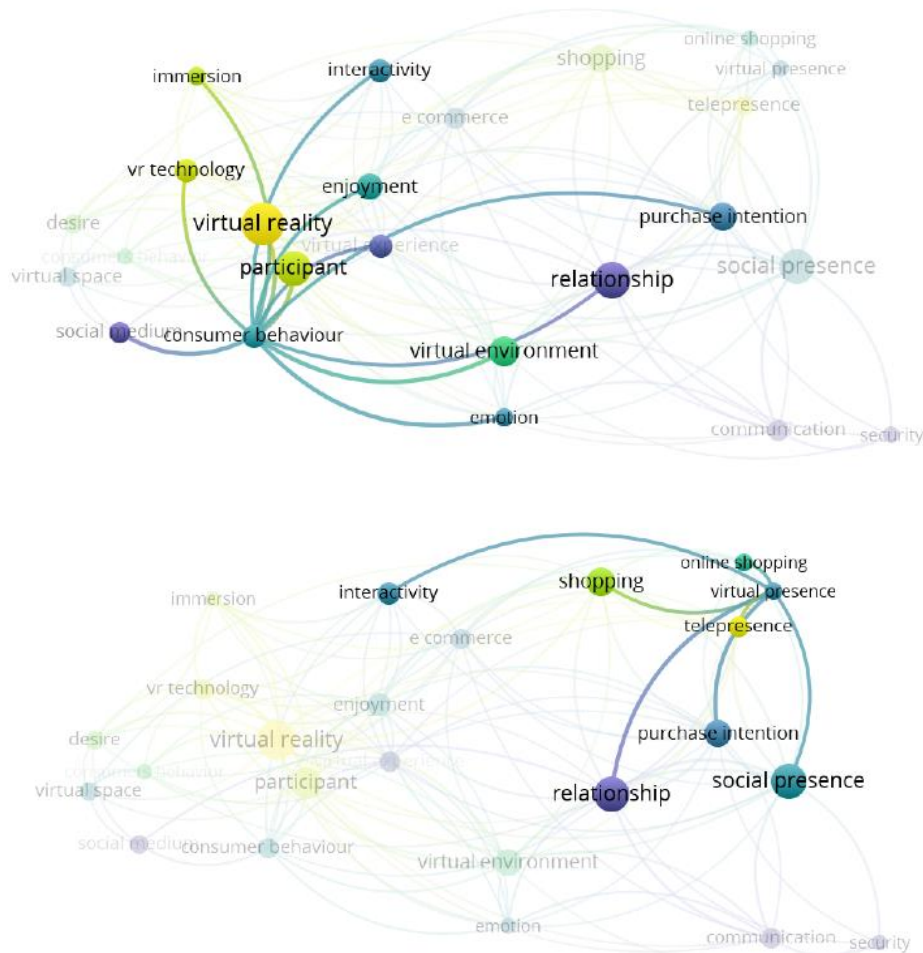


Figure 4 Key Terms Relating Virtual Presence to Consumer Behavior



In the realm of live-streaming e-commerce, numerous scholars have conducted research on the impact of virtual presence on consumer behavior. The influence of virtual presence in live-streaming e-commerce extends beyond singular dimensions of perception or behavior; instead, it encompasses multiple facets, providing multidimensional theoretical support for enhancing user experiences and facilitating transactions throughout the process.

Firstly, virtual presence plays a crucial role in promoting engagement. Research by Zhou & Huang (2023) emphasizes a positive correlation between virtual presence and purchase intention, mediated by the perception of value and moderated by consumer engagement. Ma et al. (Ma et al., 2022) demonstrate that virtual presence in live streaming can create a more immersive and interactive experience for users, thereby enhancing engagement. Virtual presence overcomes physical limitations associated with attending live events, such as fashion shows, product launches, or exclusive events that may have limited seating, location restrictions, or ticket access requirements. Through the virtual presence of live streaming, brands can extend their influence to a global audience, allowing anyone with an internet connection to participate in real-time experiences or on-demand experiences.

Secondly, virtual presence contributes to fostering consumer belongingness and community awareness. Chen & Liao (2022) find that in the virtual live-streaming space, community awareness, interactivity, and emotional support positively influence the social presence experienced by viewers, affecting their engagement with live-streaming and helping cultivate community awareness and emotional connections among viewers. Wongkitrungrueng & Assarut (2022) demonstrate a significant impact of virtual presence on social interaction and community building. In live streaming, consumers can engage in real-time conversations, share opinions, and connect with like-minded individuals through comments, likes, and shares. This virtual environment makes users stay longer, pay attention to the live stream, and cultivate a sense of belonging and community awareness.

Furthermore, virtual presence effectively creates a sense of immersion and entertainment. Su (2019) demonstrates the indirect impact of perceived usefulness, perceived entertainment, and immersion on user behavior in live streaming. Cypress & Caboral-Stevens and Panduputri & Novani (Cypress & Caboral-Stevens, 2022; Panduputri & Novani, 2021) emphasize that immersion and entertainment are essential dimensions of the impact of virtual presence. Through carefully crafted virtual presence, users can have a more realistic and immersive experience during live streaming, increasing their sense of immersion and entertainment. This enhanced perception enriches the user experience and stimulates sustained participation and interaction on the platform.

Lastly, virtual presence plays a crucial role in influencing purchase intention. Ming et al. (2021) find that virtual presence significantly and positively impacts consumer trust and flow state, prompting impulsive buying behavior. Liu et al. (2022) highlight the importance of virtual presence, emphasizing that real-time interactivity in live streaming can effectively alleviate consumer doubts about products, profoundly affecting consumer cognition and decision-making processes during live interactions. Shrestha & Bhovichitra (Shrestha & Bhovichitra, 2023) underscore the significant impact of virtual presence on users' purchase intention during live streaming. When users perceive high engagement and interactivity, they are more likely to form positive opinions about showcased products, thus increasing their purchase intention. Features such as virtual try-on, where users can see themselves wearing fashionable items, further enhance the sense of presence and facilitate confident purchase decisions.

Optimization Strategies for Virtual Presence in Live Streaming

Previously, we have demonstrated the multifaceted impact of virtual presence on consumer behavior in live-streaming e-commerce, revealing its crucial role in shaping consumer behavior patterns during live broadcasts. Given the intense competitive environment, there is an urgent need to provide substantive improvements and optimization recommendations

for virtual presence in live streaming, aiming to guide and influence consumer behavior more effectively. In the literature review stage, virtual presence was divided into four key dimensions: Live streamer, Streaming assistant Consumer, and Environment. This segmentation recognizes the indispensable roles of each dimension in the overall virtual experience and in shaping consumer behavior. Therefore, we will conduct research from these four dimensions to explore in-depth how to promote positive consumer behavior better, guiding the better development of the live-streaming e-commerce field.

Due to the significant development of live streaming in China on a global scale, the research will focus on the most representative Chinese TikTok live platform. By analyzing the top 10 sales performance rankings of influencer live rooms on this platform from November to December, as highlighted in Figure 5 TikTok KOL live data (TikTok KOL live data, 2012), the study aims to propose practical strategies for optimizing virtual presence.

TikTok Data
 jaduoduo.com

KOL

Week Ranking 12/04-12/10

Ranking	KOL	Live sales (RMB)	Sales (pieces)	Unit Price ↓	Fan NO ↓	Category
1	Eastern Selection	100 million+	10 million+	50~100	31.148 million	Food and Drinks
2	Hetian Jade Lao Zheng	100 million+	0.1-0.25 million	900~1000	1.187 million	Jewellery
3	Mr. Dong	100 million+	10 million+	100~200	30.619 million	costumes
4	Liu Yiyi	100 million+	0.25-0.5 million	500~600	1.094 million	costumes
5	Yun Shang	75-100 million	0.5-0.75 million	100~200	4.131million	Jewellery
6	Liu Yuanyuan	50-75 million	0.25-07.5 million+	100~200	17.707million	General
7	Xiao Xiao101	50-75 million	0.25-0.5 million	100~200	14.851million	costumes
8	Guo Yue	50-75 million	10 million+	50~100	20.159million	General
9	Qi Er	50-75 million	0.75-1 million	50~100	6.5million	General
10	Mr. Wei	50-75 million	7.5w~10w	600~700	25.5w	costumes

Figure 5 TikTok TOP 10 Livestreaming Sales Ranking for November-December

Live Streamer's Dimension of Virtual Presence: Building a Strong Personal Brand + Facilitating Deep Interaction

The live streamer's virtual presence refers to the immersive and on-site experience created for consumers in a virtual environment through visualizations, real-time interactions, and other methods (De Veirman et al., 2017). As both a brand representative and a customer advocate, the live streamer needs to continuously balance the needs of both sides, adopting a customer-centric approach. The live streamer's continuous efforts in the live broadcast cultivate a positive virtual presence, influencing users' positive behavior.

She was establishing a solid personal brand. Analyzing Liu Yiyi's live broadcast, ranked Top 4 in Figure 5, she shapes her style with a "relaxed" and "vintage" vibe, showcasing avant-garde trends to capture consumers' interest in advance. Additionally, she adopts a gentle



narrative style, presenting products as if chatting with friends on the sofa rather than directly promoting them. Gong et al. (X. Gong et al., 2022) found that the live streamer's personalized image, expertise, and industry information are crucial for building trust and authority in relevant fields.

He was promoting interaction and encouraging communication. Dong Yuhui, ranked Top 1 in Figure 5 for Eastern Selection, successfully builds knowledge-driven IP. Through unique bilingual live broadcasts and scene-based knowledge sharing, he presents high-end knowledge in a down-to-earth teaching style. This distinctive communication and interaction style effectively stimulates active audience participation, enhancing the virtual presence. Li et al. (2022) also emphasize the live streamer's need to strengthen communication and interaction skills, cultivate storytelling techniques to resonate with the audience through personal experiences, and use interactive elements such as polls and Q&A to encourage audience participation and create authentic conversations.

Streaming Assistant's Virtual Presence: Seamless Collaboration with the Live Streamer + Real-Time Interaction with Users

In live broadcasting, a streaming assistant refers to the individual who provides support and stimulation to the Live streamer, contributing to the atmosphere by engaging in "shout-outs" and creating an energetic environment. Excellent streaming assistants enhance the live broadcast experience by employing body language and enthusiasm, fostering excitement and engagement, and stimulating the desire to purchase (Bao, 2021).

Seamless collaboration with the Live streamer. Liu Yuanyuan ranked Top 6 in Figure 5, possesses a robust streaming assistant team. Some streaming assistants assist her in trying out products, while others cheer and shout by her side. Particularly during important brand sessions, professionals from the brand may join the live broadcast to express strong support. The active interactions of streaming assistants create a pleasant atmosphere in the live broadcast, establishing a solid connection with the audience and sparking shopping interest (Bao, 2021).

Real-time interaction with users. While assisting the Live streamer, streaming assistants must pay constant attention to consumers. They should promptly address customer inquiries, respond to comments, solicit feedback, and continually enhance their ability to engage in spontaneous interactions and conversations to create a lively atmosphere. Streaming assistants should also improve their performance and empathy during product demonstrations, conveying genuine experiences through facial expressions, body language, and verbal expressions. This approach aims to evoke a sense of virtual resonance with consumers, ultimately influencing purchase decisions.

Consumer Virtual Presence: Encouraging User-Generated Content and Sharing + Increasing Gamified Interaction

In live streaming, consumers play a role in disseminating information, preferring to stay in lively and enjoyable live broadcast environments. Song et al. (2021) research demonstrates that live streaming services enable the audience to interact with one another and the streamer over live content. This helps other customers understand products, build relationships, enhance engagement, and influence purchasing behavior. By identifying with the live streamer and products, consumers form friendships in shopping and cultivate a sense of belonging and community.

They are driving user-generated content and sharing. Observing Yun Shang's live broadcast room, ranked Top 5 in Figure 5, it is evident that Yun Shang Jewelry promotes social interaction between live streamers and consumers through a unique live shopping model. Using the slogan "Brother Dong takes you to the source market of jewelry" and employing bold bargaining strategies, they create an authentic shopping experience. This social interaction reinforces consumer trust in the products and stimulates user-generated content and sharing. By integrating social media features, Yun Shang Jewelry encourages



users to participate in discussions through comments, likes, and shares, sharing their shopping experiences, fashion items, and wish lists. This establishes a highly engaging and interactive virtual presence community (Song et al., 2021), successfully integrating into the fashion ecosystem.

They were increasing gamified interactive experiences. Analyzing the live broadcast room of Guo Yun, ranked Top 5 in Figure 5, it is evident that when collaborating with Disney, the Guo Yue couple broadcasts live at the fashion show venue. They encourage users to vote, comment, and share opinions on their favorite outfits through rewards and incentives, creating excitement and a sense of competition. Additionally, they design entertaining game interaction segments to promote social interaction and creative expression (Liu et al., 2022). In summary, by incorporating gamified elements, the interactive and entertaining aspects of the live broadcast experience are enhanced, enriching the virtual fashion experience.

Virtual Environment Presence: Comprehensive Sensory Presentation + Technology-Enabled Fun Visuals

Virtual environment presence refers to creating an atmosphere for customers during live streaming, allowing them to immerse themselves and stay engaged in online shopping as if they were in a physical store (M. Li et al., 2022; Tcha-Tokey et al., 2017). An immersive virtual environment should provide an excellent user experience, focusing on stimulating users to perceive a higher level of remote presentation. Embracing advanced technology to create a more interactive virtual environment will enhance user attention to ongoing activities and brand image, creating opportunities to establish long-term consumer relationships.

Comprehensive sensory presentation. Eastern Selection, ranked Top 1, frequently conducts live broadcasts tracing the origin of products directly from the farm. Live streamers wear local attire and showcase the local customs in meticulously arranged natural scenes, simultaneously demonstrating agricultural products' planting and processing environment, enhancing consumer trust. Additionally, Hsu (Hsu, 2022) emphasizes that live broadcasts can elevate the atmosphere and emotions through carefully planned visual, auditory, and tactile presentations, ensuring that lighting, music, background, and set designs in the live stream are visually appealing and relevant to the theme.

Technology-enabled fun environment. Praničević (Praničević, 2021) found that many outstanding live broadcast rooms adeptly incorporate new technologies such as VR and AR, introducing technological interactive elements in the virtual environment to attract viewers and enhance their virtual presence and, for example, using advanced 3D modeling and rendering techniques to create highly realistic virtual environments and increasing user engagement in the virtual environment through features like virtual try-ons, interactive product demonstrations, mini-games, or fashion-related challenges.

In summary, the four dimensions of live streamers, streaming assistants, users, and the environment impact consumer behavior during virtual live streaming. However, these dimensions are not independent during the live broadcast process; they complement and support each other. Therefore, organically combining these four dimensions during live streaming will provide customers with the best virtual presence experience. A delightful social experience and shopping journey will increase customer trust and satisfaction in the live stream. Satisfied customers, feeling sincerity, are more likely to express their experiences actively, creating high-quality electronic word-of-mouth. This, in turn, increases existing customers' purchase rate and loyalty and leads to positive behaviors, as illustrated in Figure 6.

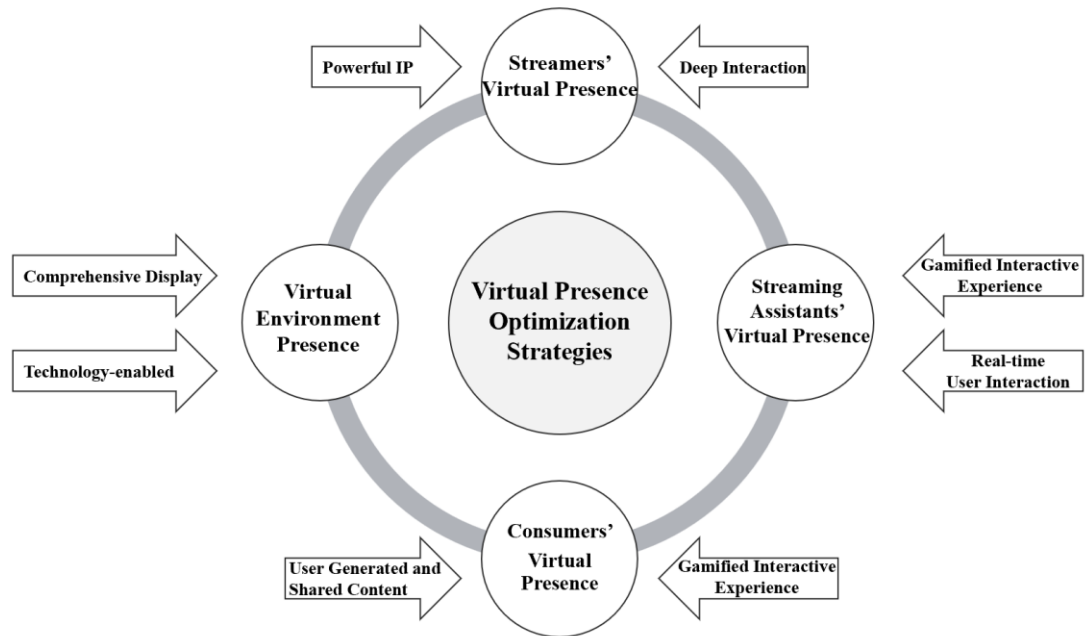


Figure 6 Strategies for optimizing virtual presence in live streaming

Conclusion and Discussion

As live commerce continues to evolve, the development of virtual presence is closely tied to technological advancements and emerging research questions. This study delineates the crucial role of streaming assistants in enhancing the virtual presence during live broadcasts. It proposes optimization strategies across four dimensions—live streamers, streaming assistants, consumers, and the virtual environment—that positively impact consumer behaviors such as engagement, social interaction, purchase intention, and brand loyalty.

Through an in-depth exploration of virtual presence in live commerce, this research validates the ongoing elevation of consumer demands. It elucidates various social needs in virtual live shopping, including emotional, psychological, social, and interactive aspects. Consequently, this study contributes to enhancing consumers' virtual presence in live shopping, fostering emotional connection, communication, interaction, and identification among live streamers and consumers, as well as between consumers. This deepening connection improves consumer awareness of live streamers, brands, and products. Simultaneously, creating a reliable and enjoyable virtual shopping environment, coupled with technological visual presentations, helps build sustained positive electronic word-of-mouth, reinforcing consumer loyalty and aiding brands in standing out in the fiercely competitive live commerce landscape.

This article enriches the theoretical understanding of virtual presence and provides insights and strategic guidance for fashion live commerce brands navigating uncertain waters. Future research can broaden its scope by incorporating the latest high-tech advancements, such as intelligent AI, virtual live streamers, and the metaverse. This multidimensional exploration can uncover the transmission mechanisms of virtual presence, enhancing the generalizability of research conclusions.

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