The Impact of Real-Time Interactivity in Live Streaming E-Commerce on Consumer Brand Loyalty

Maoze Sun

School of Management, Zhejiang University of Science and Technology, Hangzhou, 310023, China
maoze2025uk@gmail.com

Abstract. The development of live e-commerce has turned digital retail into an interaction-driven relationship ecosystem. Although studies have shown that it has a certain impact on the purchase intention, the literature has the characteristics of fragmentation and short-sightedness, and has not systematically integrated the long-term psychological mechanism behind brand loyalty. It summarises domestic and international representative research on live interactivity, value co-creation, trust generation, brand loyalty, etc. Using the framework of stimulus, organism, response (SOR) and the theory of social interaction, the role of real-time interaction as the central stimulus affecting consumers' internal cognition and emotional state is systematically explored. The comment believes that perceived value, trust, social support, reduced psychological distance, etc. are regarded as intermediary mechanisms that can link the interactive experience with the results of attitude and behavioural loyalty. More importantly, after such an analysis, it is found that psychological distance does not affect the transition of short-term participation into long-term relationship commitment. After integrating the previous research results, a conceptual sequence is proposed, in which instant interaction increases the value and reduces the distance, thus cultivating loyalty. The review also adds to the future trend of exploration, involving chain intermediary models, vertical impact and virtual streaming media driven by artificial intelligence technology. In general, this study strengthens the theoretical foundation of live broadcast and deepens people's understanding of how digital interaction can cultivate lasting brand connections.

Keywords: Live Streaming E-Commerce; Real-Time Interactivity; Consumer Brand Loyalty; Perceived Value; Psychological Distance.

1 Introduction

The rapid development of digital technology and social media platforms has reshaped the retail industry, and live e-commerce has become a business model known for its dominance and rapid growth. After integrating real-time video broadcasting, interactive communication and real-time transactions, live broadcast changes online shopping from a static information display mode to a dynamic and immersive interactive

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relationship experience[1,2]. Unlike the traditional e-commerce environment, which is characterised by asynchronous browsing and algorithm recommendation, the live broadcast platform has created a synchronous communication space, and the streaming media and the audience communicate with each other continuously, re-establishing the relationship of "people-product-context".

In the constantly developing ecosystem, real-time interactivity has become a key factor in distinguishing live streaming business from early digital retail. Elements such as streaming media-audience dialogue, audience-audience communication and instant feedback together form the immediacy and immediacy of perceived existence [1,2]. On the one hand, this interactive structure can reduce information asymmetry, and on the other hand, it can enhance consumers' psychological participation and social participation. Empirical research shows that the higher the perceived interactivity, the higher the willingness, trust generation and participation of consumers [1].

However, although the amount of research on live streaming business is large, most academic research is still short-term and for the purpose of conversion. Most studies study the results of instant behaviour, that is, purchase intention, click rate or impulse purchase, etc. Although these results are a sign of the success of the transaction, they do not reflect the strategic purpose pursued by sustainable brand development. Brand loyalty includes attitude commitment and repeated behavioural participation, which are the results of more lasting relationships, but the mechanism of psychological formation in the live environment has not been integrated [3].

In addition, the theoretical explanation behind the interaction effect is fragmented. Some scholars believe that it is social support and emotional infectious effects that play a role, and some scholars believe that it is the joint creation of values and emotional loyalty. Other studies also use the theory of quasi-social interaction to explain the relationship proximity and brand acceptance. However, these views are often examined independently and do not form a coherent framework to integrate cognitive value perception, emotional attachment and relationship proximity into a unified model.

In particular, the concept of psychological distance, which is closely related to perceived intimacy, existence, relationship, etc., is less concerned for mainstream live broadcast research. Although live broadcast imitates the nature of face-to-face communication and also increases immediacy, few studies have studied how to reduce psychological distance to transform short-term participation into long-term brand loyalty. In this way, it is impossible for customers to understand how the interactive experience turns into a long-term commitment.

Against this background, this article mainly systematically collates and synthesises domestic and foreign research on the real-time interactivity of live e-commerce and brand-related results. Refer to the stimulus-organism-reaction (SOR) model and interactive social theory.

In this way, this review contributes to literature in three ways. First, turn to long-term relationship loyalty when focussing on the results of short-term transactions. Second, classify the cognitive, emotional and relationship mechanisms into a sequential explanation structure. Third, it highlights that psychological distance is a missing but important link in live brand relationship research. Through the solidity of the theory,

this study more comprehensively understands how real-time interaction can promote sustainable brand loyalty in the digital business environment.

The theoretical basis of this research is based on several existing frameworks. According to the theory of social existence, the perception of co-existence and the level of user connection will affect each other in the process of communication. Real-time functions such as questions and answers and host-audience interaction bring a strong sense of existence, and also reduce the resistance of users to purchase [4]. The trust transfer theory shows that after generating trust in streaming media or influencers, this trust is transferred to the brand or product, especially when the host shows authenticity. The theory of quasi-social interaction explains the process of establishing an emotional bond between the audience and the streaming media. The streaming media strengthens the perception of authenticity, trust and credibility to form consumers' identity and willingness to buy. These mechanisms play a more prominent role in live commerce.

Research shows that urgent clues and product availability restrictions will trigger FOMO (fear of missing) impulse buying behaviour, overturning the previous rational decision-making process [5]. In the empirical study, the correlation matrix shows that there is a strong positive correlation between all variables at the 0.01 significance level, indicating that real-time participation, brand trust and purchasing behaviour promote each other. The strong predictive nature of real-time participation shows that LSE relies on dynamic interaction to strengthen emotional connections and stimulate impulse shopping. These on-site activities bring experience value to customers, improve customers' sense of participation, reduce psychological barriers to purchasing, and go deeper than economic transactions. Brand trust obviously affects purchasing behaviour, verifying the discovery that emphasises that the influencer is a "trusted agent", clearly displaying items, answering questions and taking on roles to contact enterprises and consumers[6]. This set of evidence shows that long-term participation rather than short-term incentives can promote honest and trusting behaviour of customers, which has a significant impact on customer behaviour in the long run.

2 Real-Time Interactivity as the Core Psychological Mechanism

Real-time interactivity has been widely regarded as the key point that distinguishes live business from traditional e-commerce platforms. Existing research has been conceptualising interactivity into a multi-dimensional structure, which generally includes the interaction between streaming media and the audience, the interaction between the audience and the audience, and the support feedback mechanism provided by the platform [7]. Streaming audience interaction is a real-time dialogue and personalised response, which improves the responsiveness of perception and reduces uncertainty [2]. The interaction between the audiences is reflected in visible comments and real-time purchase notifications, bringing the experience of social existence and the effect of collective participation [3]. The platform interactivity has an instant feedback system and dynamic promotion tools, which can speed up decision-making and increase the sense of situational immersion[8].

Consumers' purchasing attitude, trust, etc. are dynamically influenced by social influence, real-time feedback, emotional connection and other aspects[9]. In summary, these five aspects will change online consumption from personal cognitive activities to social embedded interactions.

Based on these interaction dimensions, scholars have explored various psychological mechanisms of how interaction affects consumer results. A dominant research route is to use the stimulus, biological, response (SOR) model to locate interactive environmental stimuli, and regard interactivity as an environmental stimulus that activates the internal cognitive and emotional state. On this basis, perceived value, emotional energy and user stickiness are generally regarded as intermediaries at the organismal level. Perceived information and entertainment value can well regulate the connection between the intensity of interaction and the willingness to buy, and emotional participation enhances behavioural results by improving immersion and participation.

In addition, the formation of trust has also become a major process. Timely product demonstration and transparent communication can reduce the unequal information and enhance the sense of identity of the viewer. After testing, it can be seen that trust will not only directly trigger the willingness to buy, but also indirectly enhance brand loyalty by strengthening positive brand evaluation[2]. The research on value co-creation focusses on the utility of participatory interaction in shaping emotional loyalty. Relying on cooperative participation and emotional fit, customers have broken through the scope of simple functional judgement and began to have a more far-reaching emotional dependence on the brand.

In addition, some researchers believe that under the background of live broadcast, the brand attitude and brand loyalty shaped by storytelling are effective [10]. From this, it can be concluded that interactivity and narrative structure affect each other, thus affecting cognitive evaluation and emotional attachment. Correspondingly, there is a cross-research on social media interaction. Relationship participation will improve consumers' loyalty to the brand through emotional and social connections. In addition, the quasi-social interaction literature believes that the perception of intimate relationships and quasi-social relationships are predictors of brand acceptance and intimate relationships [11].

Although this research is constantly developing, most studies regard perceived value, trust, emotional loyalty, social support and quasi-social interaction as independent ways of explanation. Few people integrate them into a sequential relationship framework to reflect the whole process from interaction stimulation to psychological change to brand loyalty. Fragmentation highlights the importance of more systematically integrating cognition, emotion and relationship mechanisms in live interaction research.

3 From Psychological Mechanisms to Sustainable Brand Loyalty

Although previous scholars have done a lot of research on the direct behavioural consequences of live interaction, there is still a lack of theoretical problems between short-term participation and sustainable brand loyalty. In the digital business environment, brand loyalty is generally understood as two parts: attitude and behaviour, namely psychological commitment and repeated purchase behaviour [1]. However, in existing studies, the relationship between real-time interaction and promotion of these two dimensions is still unclear.

In terms of cognitive evaluation, interactivity is to embed products in an immersive and emotionally resonant environment, so as to enhance brand perception and brand attitude. According to empirical research results, interactive presentations and narrative frameworks will improve consumers' brand evaluation and generate positive attitudes [10]. At the same time, research on brand cognition has also found that instant explanation and contextual presentation can reduce consumers' sense of uncertainty, thereby improving consumers' perception of brand and brand ability, thus improving consumers' attitude and loyalty. In this case, the perceived information value and entertainment value are the cornerstones of the formation of a positive brand attitude before the emergence of behavioural commitment [12]. All the above results show that interaction first changes consumers' cognitive evaluation of the brand, thus laying a positive attitude foundation for the formation of loyalty.

In addition to cognitive evaluation, emotional attachment plays an important role in turning participation into loyalty. Research on value co-creation believes that participatory interaction can rely on strengthening emotional resonance and identity recognition to cultivate emotional loyalty [3]. When consumers feel that they are active contributors rather than passive audiences, the connection with the brand will become closer. Research on social media interaction also shows that emotional participation and community belonging can predict the results of brand loyalty [1]. In addition, there is trust formation as a strengthening mechanism for this process. Real-time responsiveness and authenticity improve the credibility of perception, which in turn strengthens emotional loyalty and brand commitment [2]. In summary, loyalty in the live broadcast environment is not only the result of rational evaluation, but also the formation of emotional and relationship experience.

Beyond cognitive evaluation, emotional attachment plays a central role in transforming engagement into loyalty. Research on value co-creation emphasizes that participatory interaction fosters affective loyalty by strengthening emotional resonance and identity alignment. When consumers perceive themselves as active contributors rather than passive viewers, they develop stronger relational bonds with the brand. Studies on social media interaction further confirm that emotional engagement and community belonging significantly predict brand loyalty outcomes. Moreover, trust formation functions as a reinforcing mechanism in this process. Real-time responsiveness and authenticity increase perceived credibility, which in turn strengthens emotional loyalty and brand commitment [2]. Taken together, these

findings highlight that loyalty in live streaming environments is not solely a function of rational evaluation but is deeply embedded in affective and relational experiences.

But behavioural loyalty cannot be explained only by emotional attachment. Research has found that repeated participation is directly related to the satisfaction of the relationship and the perceived affinity of the relationship. Although many empirical models regard loyalty as willingness to buy back or continuous participation, there are few models that clearly distinguish between short-term repetitive behaviour and long-term relationship commitment. Quasi-social interaction research shows that perceived intimate relationships and semi-social ties will improve consumer acceptance and loyalty [11]. This means that close relationships can act as a bridge between emotional attachment and behavioural persistence.

Despite these views, current studies rarely include cognitive assessment, emotional attachment, trust enhancement and relationship proximity into the same loyalty system. Some models focus on perceived value and emotional loyalty, while others focus on trust and brand attitude. Some people also study narrative persuasion and social bond mechanisms [10]. However, most of their research fields still exist in parallel, not in order. Without the development process of comprehensive relationships, from perceived value to trust, from trust to reducing psychological distance, from reducing distance to continuous loyalty, it is difficult for current academic research to give an in-depth explanation.

4 Theoretical Gaps and Research Challenges in Live Streaming Interactivity Research

One limitation is the continuous strengthening of short-term behavioural results. Most empirical studies take purchase intention, impulse purchase or instant participation as the main independent variables. Although these indicators can measure conversion efficiency well, they do not reflect the commitment to sustainable relationships. Even if loyalty is reviewed, it will be narrowly regarded as a buyback intention, regardless of attitude and behaviour. Only a few studies clearly distinguish between emotional loyalty and behavioural loyalty, and test the difference predictors between the two. In addition, research on brand recognition and loyalty believes that brand recognition is very important, but it rarely links cognitive evaluation with long-term relationship attachment. Therefore, the current research is still stuck in the centre of conversion, and lacks the perspective of systematic interpretation from the perspective of how interactive participation can promote the persistence of brand relationships.

Another important theoretical gap is the lack of integration of psychological distance and close relationship. Although the quasi-social interaction literature believes that intermediary communication will produce perceived intimate relationships and quasi-social ties, this structure is rarely included in the mainstream live broadcast loyalty model. Research on social media interaction shows that emotional ties and community participation can improve brand loyalty, but close relationships are not explicit, but implicit, not a clear concept of shortening distance. Research on emotional loyalty and brand attachment believes that emotional ties are a predictor of loyalty, but

psychological distance has not been systematically theorised as an intermediary bridge between cognitive value perception and behavioural persistence. If the relationship proximity is not regarded as a dynamic structure, the interactive experience will become a situational stimulus, not a gradually deepening relationship.

The limitations of the method hinder the development of the theory. Most empirical surveys use cross-sectional survey design and structural equation modelling methods, which limits causal inference and vertical understanding of loyalty development. There are very few experimental studies, and only a few narrative-based design studies have explored the contextual effect. In addition, most of the research is carried out in China's live broadcast ecosystem, which limits cross-cultural applications. The establishment of trust, the generation of a sense of authority and the different cultural differences in the sense of rules will all have an impact on interactivity, but no comparative study has been carried out. In addition, the rapid emergence of artificial intelligence-driven virtual media has brought new shocks to the dynamics of new relationships that cannot be included in the existing framework.

It can be seen from the above that these theoretical and methodological obstacles require a more comprehensive integration relationship. Such a framework should break through the isolated intermediary model and short-term conversion logic, and systematically connect perceived value, trust formation, psychological distance reduction and loyalty results in a coherent explanatory structure. Only in this way can the study of live interaction well grasp the process of transformation between transaction participation and sustainable brand loyalty.

5 Future Research Directions

On this basis, future research should develop towards a more comprehensive and relational paradigm in checking the interactivity of live broadcasts. The main direction is to develop and empirically test the sequence adjustment model, which links interactive stimulation with sustainable brand loyalty. Although previous studies have independently studied perceived value, emotional participation, trust formation, emotional loyalty, and brand recognition, these structures are rarely modelled within one framework [7,9]. Future research can be carried out from three aspects: whether perceived value enhances trust, whether trust reduces psychological distance, and whether attitude and behavioural loyalty are strengthened after reducing distance. By embedding the relationship close to the SOR-based structure, scholars can shift from an isolated intermediary model to a more coherent interpretation framework.

The second direction is that the formation of loyalty is time-oriented. Most of the current studies use cross-sectional survey design, that is, to examine consumers' views in a period of time [3]. Loyalty is a vertical, repeated interaction and a constantly developing relationship attachment. Future research should use vertical design to study how the continuous contact interactive environment shapes brand attachment, and whether the close relationship strengthens or weakens over time. In addition, experimental research can also manipulate interactive characteristics, such as response speed, degree of personalisation or narrative immersion, to examine the causal impact

of these factors on the perception of intimacy and loyalty results. The diversification of this method will greatly enhance the degree of causal reasoning and theoretical stability.

Third, cross-cultural and cross-cinter context comparisons should be paid more attention to by the academic community. Most of the experiences come from China's live ecology, which is very mature and has strong social integration. However, in terms of trust generation, sense of authority and relationship participation, its cultural norms are also different due to different markets. Comparative research can test the psychological mechanism identified in the current research, whether there is a similar operation mode in the West or emerging markets, and whether the intermediary role of psychological distance in the cultural context is the same. The view that the relationship bond process is culturally accidental in social media interaction research and quasi-social interaction research has been inspired by the above literature.

Therefore, expanding cross-cultural analysis can improve the external effectiveness of the theory of live interaction.

The new theoretical problems arising from the rapid development of digital technology have not been studied, and the new theoretical problems arising from the rapid development of digital technology have not been studied. After the emergence of new technologies such as virtual streaming media and automated interactive systems triggered by artificial intelligence, the conventional hypothesis of trust and close relationship between human intermediaries has been disrupted.

Although studies have shown that authenticity and emotional resonance are factors contributing to loyalty, no one has yet specified whether a similar mechanism is established in the case of artificial agency as an intermediary. Future research can examine consumers' views on the authenticity, credibility and psychological distance in the live broadcast environment based on artificial intelligence, and whether virtual influencers can make comparable relationship commitments.

Integrating technological development into the structure of relationship marketing is of great significance for promoting the theory in the rapidly changing digital business environment.

Therefore, future research should first start from the four aspects of theoretical integration, vertical analysis, cross-cultural comparison and technological innovation. By systematically linking cognitive evaluation, emotional attachment, relationship proximity and technical mediation, scholars can have a more comprehensive understanding of how real-time interaction promotes the sustainability of brand loyalty in live business.

6 Conclusion

This article tries to systematically explore how real-time interaction in live e-commerce promotes sustainable consumer brand loyalty. Although the existing academic studies have given a certain amount of empirical evidence linking interactive participation with purchase intentions and short-term behavioural results, the research on long-term relationship mechanisms is blank. Through the study of perceived value, trust building,

value co-creation, brand recognition, social interaction and quasi-social connection, the fragmented theoretical chain is connected to form a more continuous whole.

The review believes that real-time interaction is not only a technical burden, but also a stimulus to a person's psychological state. By improving the value of perception information and experience, strengthening trust and emotional attachment, and promoting the intimacy of relationships, interactive participation slowly turns transaction participation into a lasting brand commitment. However, most of the previous studies have been one-sided and isolated studies of these mechanisms. At present, people comprehensively attach importance to the role of sequential integration, and link cognitive evaluation, emotional attachment and psychological distance reduction in the unified progress of attitude and behavioural loyalty.

It is worth noting that this article regards psychological distance as an important but underdeveloped structure in live business research. Although emotional loyalty, quasi-social interaction and other structures implicitly solve the intimacy of the relationship, it is still limited to clearly incorporate it into the loyalty formation model. Adding psychological distance to the SOR-based framework gives a more complete explanation of how the interactive experience can break through the short-term conversion logic and shape a lasting brand connection.

In summary, this study shifts the focus of analysis from immediate behavioural results to long-term relationship sustainability, which contributes to the theoretical integration of live interaction research. With the continuous development of live broadcast business, especially with the emergence of artificial intelligence-driven interaction and cross-cultural communication, future academic research should comprehensively and deeply capture the complex process behind interactive brand loyalty from a comprehensive and vertical perspective. By promoting the connection framework formed by interactivity, psychological mechanism and loyalty, this investigation provides a foundation for a more systematic understanding of the development of sustainable brands in the digital business environment.

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