

A Review of the Influence of Other Customers Cues on Customers' Engagement Intention in the Live Streaming E-Commerce Situation

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Abstract. Compared with traditional e-commerce, "live streaming + e-commerce" is highly popular because of its obvious advantages such as timeliness, sociability, conciseness and entertainment. Live streaming has become one of the main ways for people to shop, and has also become a standard marketing channel for brand merchants. Flow and retention are the ceiling that determines the transaction of live e-commerce, and a comprehensive consideration of the customer's engagement intention in both transactional and non-transactional forms is necessary. According to the theory of servicescape, other customers are important social cues in the servicescape, which affect the customer's behavioral intention. Therefore, this paper focuses on the impact of other customer cues on customers' engagement intention in the live streaming e-commerce situation, systematically reviews the research on the concepts, classifications, and influencing factors of other customer cues and customers' engagement intention, classifies other customer cues into the three dimensions of usefulness, interactivity, and visibility, analyzes their impact on the two types of customers' engagement intention, and concludes with an outlook of the future development trend.

Keywords: Live Streaming E-Commerce; Other Customer Cues; Customers' Engagement Intention; The Theory of Servicescape.

1. Introduction

Since 2016, live streaming e-commerce has developed rapidly and has become a marketing model with Chinese characteristics, which is a research hotspot in recent years. As of December 2022, the number of live streaming users of e-commerce was 515 million, an increase of 51.05 million compared with December 2021, accounting for 48.2% of the total Internet users, and live streaming has become one of the main shopping methods of people. "Live streaming + e-commerce" is popular because of its timeliness, social, preferential, entertainment and other obvious advantages, and compared with traditional e-commerce, it is closed-loop marketing, order path shorter, is an effective tool for brand marketing, building explosive products, and increasing sales, so it has become a standard marketing channel for brand merchants. Flow and retention are the ceiling to determine the transaction of live streaming e-commerce, the platform will be based on the heat of the broadcast room (online number, number of likes, number of comments, user stay time, etc.) to push targeted, and the turnover is closely related to sales performance, so for merchants, the interaction of live audience and purchase are equally important. This paper focuses on the research results of transaction and non-transaction engagement intention in live streaming. Previous studies, based on the shopping characteristics of live streaming e-commerce, mostly started with customers' purchase intention - engagement in transaction forms, and paid less attention to customers' non-transaction forms of engagement. Moreover, studies that comprehensively considered the two types of engagement intentions were also limited. Early studies on live streaming engagement focused on the impact of customers' viewing motivation and intention. Some studies, based on the technology acceptance model, explored the factors affecting customers' continuous viewing and use intention from the perspectives of perceived ease of use and perceived usefulness. Some studies exclude shopping behavior. However, due to the characteristics of real-time interaction, content creation and

consumption synchronization of live streaming e-commerce, a series of behaviors such as purchase and interaction generated in live streaming cannot be clearly separated in time and are all intertwined. It is necessary to consider both transactional and non-transactional forms of engagement together.

The study of servicescape theory points out that the various cues in the service place will have an impact on customer behavior. Baker et al. (1994) believed that servicescapes should include three dimensions: atmosphere, design and social elements, among which social elements refer to the clues related to people in the environment, including customers and service personnel [1]. Live shopping is an online servicescape, and the participants involve anchors and customers, both of which can influence the behavior of others as the subject of information transmission. Anchors are one of the key contents of live broadcast research. Many studies have proved that the professionalism, popularity, charming, credibility, interactivity and other attributes of anchors will have an impact on customer attitudes and behaviors. The bullet-screen published by other customers in the live streaming, the information conveyed, the indirect display of behavioral clues, etc., will have a certain impact on the customers who watch the live broadcast together. Other customers may be as important or even more important than the anchors. Martin (1996) believed that the psychology and cognition of customers in the service scene would be affected by other customers, for example, interaction with other customers would significantly affect the evaluation of the whole experience process [2]. As people who watch the live broadcast together, the behavioral cues of other customers can also have an impact on customers. Therefore, from the perspective of customers, this paper summarizes the relevant researches on the concept, classification and influencing factors of live streaming e-commerce, other customer clues and customer engagement intention, sorts out the researches on the influence of other customer clues on customer's engagement intention, analyzes the internal mechanism of influence, and provides reference for future research.

2. Related Research on Live Streaming E-Commerce

2.1. Definition and Classification of Live Streaming E-Commerce

Live streaming e-commerce is an emerging business model. Tan (2017) pointed out that e-commerce is the foundation and live streaming is the means. Users and commodity sales are connected through live streaming media. Some scholars believe that live streaming e-commerce is a new form of social commerce (Lu et al., 2018). Li Miao and Hua Ying (2021) propose that live streaming e-commerce is a business model that integrates real-time information flow and real-time interaction to conduct business activities, and promotes product sales and customers' social business behaviors through all-round real-time display and interaction [3]. In summary, this paper believes that live streaming e-commerce is a marketing model with certain social attributes, in which anchors introduce and display products to customers in real time and interact with customers in real time through live streaming platforms. Live streaming can achieve various purposes such as promoting sales, promoting brands, expanding channels and drawing customers' distance.

The "live streaming+" mode has entered the public view. According to the content, it can be divided into various types of network live broadcast such as live show, live game and so on. Live streaming e-commerce is a mode derived from it. According to different live streaming platforms, live streaming e-commerce can be divided into two categories: "e-commerce + live streaming" and "live streaming + e-commerce". The former refers to the addition of live streaming functions on traditional e-commerce platforms, such as Taobao, Jingdong and Pin-duoduo. Compared with traditional e-commerce, live streaming e-commerce has significant advantages, such as strong interaction, immediacy, entertainment and visibility [4]. The latter are mostly social content platforms, such as Douyin, Kuaishou and XiaoHongshu, which have their own live streaming properties. Live streaming is a means of monetizing traffic. Live streaming content is diversified, and live streaming is only one form of it. This kind of platform has obvious social attributes, and the relationship between users is closer, and users have various motivations for watching live streaming, such as hedonic motivation and utilitarian motivation.

According to the different anchors, live streaming e-commerce can be divided into various types such as merchant self-streaming, star live streaming and KOL live streaming [5]. Merchant self-streaming refers to the live broadcast by the designated personnel (entrepreneurs, shop assistants, anchors, etc.) of the enterprise, recommending the sale of the brand's products. This kind of live broadcast has a lower cost, can directly face customers, and better understand the demands of customers. Star live streaming generally refers to public figures with high visibility and influence who open live broadcasts, have a large number of fans, cooperate with multiple merchants, and sell diverse products. KOL live streaming refers to the "master" live broadcast on the network with certain popularity, influence and professionalism in a specific field. Such anchors have certain professional skills and unique personal charming.

2.2. Research on Live Streaming E-Commerce

Live streaming e-commerce is one of the research hotspots in the field of marketing in the past five years. Scholars focus on the characteristics of live streaming shopping and conduct more discussions on customers' behaviors in live streaming, including the study of customers' motivation to watch live streaming and the factors influencing their purchasing behaviors. In the process of live streaming, customers' psychology and behavior will be affected by various factors. Apart from the factors of the product itself, anchors, platforms and other customers will affect customers as external stimulus.

As a participant in live streaming, anchors are the intermediary connecting products and customers. Anchors are the main source of information for customers, and the characteristics or attributes of anchors are particularly important. Many scholars have studied the characteristics of anchors to explore which attributes of anchors will have an impact on customer behavior, as shown in Table 1, including interactive, credibility, professionalism, attractiveness, popularity and other attributes. Han Xiaoyi and Xu Zhengliang (2020) believe that the attributes of e-commerce anchors include four aspects: charming, recommendation, display and interaction, which will influence customers' purchase intention through the internal state of customers. Meng Lu et al. (2020) adopted a combination of quantitative and qualitative methods to study which attributes of anchors can attract customers and promote their purchasing behaviors. Based on the theory of information source characteristics, customers will pay attention to the credibility, professionalism, skill, interaction and attractiveness of live streaming Internet celebrities, and there are differences in the characteristics valued by customers for different types of Internet celebrities [6]. In addition, Liu Zhongyu et al. (2020) also proposed that the similarity between anchors and customers would also affect customers' cognition.

Table 1. Related research on the attributes of live streaming e-commerce anchors

Scholars (year)	Variable Names	Partition of Dimensions
Han Xiaoyi, Xu (2020)	E-commerce anchor attributes	recommendation attributes, display attributes, and interactive attributes
Chen Haiquan et al. (2020)	Internet celebrities	visibility, interaction, product involvement and innovation
Meng Lu et al. (2021)	Internet celebrity information sources	credibility, entertainment, professionalism, usefulness, interactivity, skill and attractiveness
Zhao Dawei et al. (2021)	E-commerce anchors feature	interaction, professionalism and charming
Wang Jiabao et al. (2021)	e-commerce anchors attribute	attraction, affinity, professionalism and interactivity
Xu Yue et al. (2021)	Anchors feature	visibility, professionalism, and product involvement
Zhao Baoguo, Wang (2021)	E-commerce anchors feature	interaction, authenticity, professionalism and popularity
Wei Jianfeng et al. (2022)	anchors feature	professionalism, interaction, attraction and popularity

Live streaming can be regarded as a kind of service, and customers are in the process of receiving services when they watch live streaming. In the process of live streaming, what customers see and feel is valuable. The interface design of the live streaming platform (such as ease of use) and the shopping atmosphere created by the live streaming room can promote customers to buy. Scholars' researches on customer behavior variables in live streaming mostly focus on purchase intention, impulse purchase intention, repurchase intention, participation intention, etc. A few focus on negative behaviors of customers in live streaming, including return and exchange behavior(Wu and Yan, 2021), customer verbal aggression(Xie et al., 2022), revenge desire(Yuan and Li, 2022) and so on. In the early stage of live streaming research, the motivation, intention and engagement intention of customers to watch live streaming were discussed. For example, Hilvert-Bruce et al. (2018) pointed out that the motives of viewers to participate in live streaming include making friends, entertainment needs and information needs based on the use satisfaction theory [7]. Cai et al. (2018) pointed out that customers have utilitarian intentions and hedonic intentions when watching live broadcasts, while Ma (2021) believed that social motives should also be included. Zhou et al. (2019) found that the factors affecting customers' viewing of live streaming include user characteristics, anchor attributes, social functions, etc. Since the most important purpose of live streaming e-commerce is to sell goods, customer purchase accounts for the vast majority in relevant studies. Live streaming e-commerce allows customers to feel the "face to face" interaction between anchors and other customers, and the sense of social presence is also an important part of the research. Zhou Yongsheng et al. (2021) studied the influence mechanism of customers' purchase intention from the perspective of social presence, and believed that social presence in the context of live e-commerce, including cognitive and emotional aspects, had an impact on purchase intention, and perceived usefulness and perceived trust played a mediating role. In the process of live streaming, customers' interactive experience (interaction with anchors, other users and platforms) determines customers' attitudes and behaviors to a certain extent. Some scholars have explored the influencing factors of customer behaviors from the perspective of relationship.

3. Other Customer Cues

3.1. Concepts of Other Customers

In the theory of servicescape, Other Customers, like service personnel, belong to social cues (Baker, 1987) and are an indispensable part of the servicescape, playing an important role. Langeard et al. (1981) proposed A service output model to divide customer groups. Customer A refers to customers in service, and customer B refers to other customers sharing service, and customers will influence each other. Grove and Fisk (1983) listed other customers as the "audience" of the service in their research model. Brocato et al. (2012) defined other customers as those who are in the service environment at the same time as the central customer (but are not familiar with them). Similarly, Bitner (1990) believes that other customers are unfamiliar customers appearing in the process of service contact. Some scholars regard other customers as peer customers. Wu Li (2014) believes that other customers are consumers other than themselves under the same consumption time and space. Based on this, this paper defines other customers as other customers who are in the same live streaming room with customers and share services and information. Social cues refer to human factors in service scenes. Hu et al. (2006) defined social cues as special symbols and factors with specific social significance in service scenes, including both interpersonal interaction and physical cues with social significance [8]. Some scholars divide the social cues of network service scene into two categories: physical social cues and personnel social cues (service personnel and other customers). This paper adopts the definition of Hu (2006) and defines Other Customer Cues as special symbols and factors related to other customers with specific social significance in live streaming scenes.

3.2. Dimensions of Other Customer Cues

The presence of other customers will have a profound impact on customer experience. Existing literature has not yet divided the dimensions of other customer cues in servicescape into three aspects: physical aspects (appearance, dress, language, etc.), social aspects (behavior, emotion, etc.) and background aspects (status, image, etc.). From the perspective of social influence, Latane (1981) pointed out that the number, spatial or temporal distance, and importance of other customers would have an impact. Brocato et al. (2012) proposed other three-dimensional structures of customer perception (similarity, physical appearance and appropriate behavior) and verified their impact on customers' approach and avoidance intentions. Yi et al. (2013) and Van Tonder (2018) both believe that other customers' trustworthiness will affect customer citizenship behavior. Kim and Lee (2012) proposed that other customers include number, age, gender, appearance, dress and public behavior, and the importance of each dimension changes according to the situation [9]. Zhao Xiaoyu et al. (2012) studied the influence of compatibility among customers and analyzed the contents of four aspects: spatial, feature, language and behavioral compatibility. Similarly, Li Dongjuan (2014) studied the factors that affect customers' perception of service quality in the hotel context, including other customer behaviors (four dimensions of customer dress, customer speech, civilized behavior and interactive behavior). Soderlund (2011) pointed out that in the retail environment, there are three factors related to other customers: quantity (Argo et al., 2005), visible consumption and purchasing activities, and brief interaction, all of which have an impact on customer satisfaction [10]. Most of these studies start from the offline physical environment, such as restaurants, supermarkets, hotels, etc., and pay little attention to online servicescape.

Table 2. Classification of other customer cues

Scholars (year)	Dimensions	Partition of Dimensions
Söderlund(2011)	Three dimensions	quantity, visible consumption and purchasing activities, and brief interactions
Kim and Lee(2012)	Six dimensions	number, age, sex, appearance, dress, and public behavior
Zhao Xiaoyu et al. (2012)	Four dimensions	Four-dimensional space, feature, language and behavior compatibility
Brocato et al. (2012), Li Jianxin et al. (2015)	Three dimensions	similarity, physical appearance, and appropriate behavior
Yi et al. (2013)	Three dimensions	trustworthiness: attractiveness, trustworthiness, professionalism
Li Dongjuan (2014)	Four dimensions	customer dress, customer speech, civilized behavior and interactive behavior
Van Tonder(2018)	Two dimensions	source credibility: degree of professionalism and trustworthiness
Yu Xin et al. (2017)	Four dimensions	usefulness, interactivity, visibility and entertainment
Gao Xiayuan et al. (2021)	Two dimensions	Mutual assistance and situational facilitation

Other customer research in the online environment is often contained within social cues, which are rarely studied separately, most typically online reviews. In the live streaming e-commerce context, other customer studies are similar. Yu Xin et al. (2017) studied the impact of danmaku information sent by other customers in live streaming, including its usefulness, interactivity, visibility and entertainment [11]. From the perspective of co-viewers, Gao Xiayuan et al. (2021) divided other customer cues in live streaming into danmaku mutual assistance and situational facilitation [12]. Scholars have been trying to extend the study of offline servicescape model to the network environment. This paper believes that some other offline customer cue studies can be further verified

in the online environment. According to the characteristics of the live streaming situation, the basic characteristics of other customers such as age, appearance and dress cannot be observed, but customers can observe the interaction between customers (danmaku) and some behaviors (entering, liking, browsing and purchasing, etc.). Combined with the studies of Soderlund (2011), Yu Xin et al. (2017) and Gao Xiayuan et al. (2021), since the number of online viewers in live delivery has been verified to have a positive impact on customer behavior (Peng Yuhong and Hao Liaogang, 2022; Yao, 2017), this paper no longer focuses on the impact of the number of other customers, and divides other customer leads into three aspects: Usefulness, Interaction and Visibility. Usefulness is the extent to which customers can gain knowledge, experience, and help from the barrage sent by other customers to make relevant decisions (Mudambi and Schuff, 2010; Gao Xiayuan et al., 2021), interactivity refers to the degree to which other customers or other customers and anchors exchange information through the danmaku to achieve interaction, and visibility refers to the degree to which customers observe other customers' behavioral cues in the visual information presented by the live streaming interface .

3.3. Measurement of Other Customer Cues

The scales of the three dimensions of other customer cues can adopt the existing mature scales at home and abroad and be slightly adjusted according to the live streaming situation. Xue et al. (2020) used three question types to measure the usefulness [13], and Gao Xiayuan et al. (2021) verified the scientific nature of the scale in a live streaming situation. Van Dolen et al. (2007) used four question types to measure group interaction [14], and Li Qi et al. (2021) applied them in live streaming situations. Based on the measurement made by Wang and Yu (2017) [15], Li Mengyi (2021) measured the behavioral visibility in live streaming situations. The specific items are shown in Table 3.

Table 3. Measurement of other customer cues

Variable names	Measurement items	Sources
Usefulness	1. I can get advice and help through danmaku messages.	Xue et al. (2020)
	2. I can offer my shopping knowledge and experience through danmaku.	
	3. I can increase my knowledge of products through danmaku.	
Interactivity	1. Other customers of the live streaming room actively participate in the interaction.	Van Dolen et al. (2007)
	2. Other customers in the live streaming room are very interested in the live content.	
	3. The other customers in the live streaming room were very enthusiastic.	
	4. Other customers in the live streaming room are very active.	
Visibility	1. While watching the live streaming, I could see other customers paying attention to the live streaming room.	Wang & Yu (2017)
	2. While watching the live streaming, I could see that other customers had "liked" the live streaming room.	
	3. While watching the live streaming, I was able to see other customers browsing the products in their cart.	
	4. While watching the live streaming, I was able to see other customers buying products.	

3.4. Impact Studies on Other Customers

As part of the service environment, the words and behaviors of other customers will have a positive or negative impact on customers, including customer citizenship behavior, participation intention, service quality perception and evaluation, etc. The research involves the presence of other customers,

improper behavior, interaction between customers, customer compatibility, as well as specific situations such as hotels, restaurants, clothing stores and online stores. Other customers are part of the social cues in the servicescape, and some studies regard them as a dimension of the servicescape. Tian Ying (2021) studied employees and other customers as a dimension of Hema fresh food servicescape and pointed out that the influence of employees and other customers on repurchase intention would be mediated by customers' perceived value. Li Chang et al. (2014), the presence of social cues in service scenes (service personnel and other customers) will encourage customers to have a good scene impression, thus generating positive emotions and higher perception of service quality, and eventually having higher behavioral intention [16]. Some other studies focus on the role of other customers. Pranter and Martin (1991) emphasized the influence of other customers on customer service experience and proposed compatibility management. Customer compatibility refers to the matching degree between customers in the service place. Customer perceived compatibility will bring positive effects, while perceived incompatibility will lead to negative behaviors such as dissatisfaction and complaint.

3.4.1 Other Customers Presence

Based on social influence theory, people are influenced by the presence of others, such as other customers. Argo et al. (2005) studied the impact of simple social presence in the retail context and found that non-interactive (indirect interaction) social presence of different sizes and degrees of proximity would affect customers' emotions and behaviors [17]. In the presence of other customers, an increase in the number of other people nearby led to an increase in annoyance and self-awareness, a decrease in happiness and self-confidence, and an increase in self-presenting behavior in terms of brand choice, but proximity to others moderated this effect. Customers influence each other directly through interpersonal contact in a business environment, or indirectly by being part of the environment (Martin, 1996). Direct customer language communication can convey information and have positive and negative effects. There are many studies on the positive effects on customer interaction, such as customer interaction improving customer experience and higher satisfaction. Miao et al. (2013) explained the internal mechanism of other customers' influence on customer experience from the perspective of psychological distance. Cao Zhongpeng et al. (2022) also pointed out the impact of customers' indirect interaction on perceived self-service quality. Jang et al. (2015) and Erkmen et al. (2019) found that other customers sharing the same service environment also affect customers' evaluation of brand image. Kwon et al. (2016) proved that in traditional shopping centers, when there are perceived similarities between customers and others, the mere presence of other shoppers can have an impact.

3.4.2 Positive and Negative Effects of Other Customer Behaviors

Other customer behaviors can have a positive impact. Rosenbaum et al. (2007) found that customers receiving social-emotional support and instrumental support from other customers can improve their voluntary performance behaviors (helping and autonomous behaviors) and enhance their loyalty to service organizations. Zhang et al. (2010) used critical event technology to analyze the impact of nine types of events related to other customers (direct/indirect interaction, positive/negative events). In different servicescape, the degree of impact is different, but in general, the presence of other customers brings more positive experience than negative experience [18]. Yi et al. (2013) pointed out that other customer citizenship behaviors are important factors driving customer citizenship behaviors. Xiao Shulan et al. (2018) pointed out that other customer specialties will promote customer learning behavior, and this relationship will be regulated by customer perceived support. Xu Zaijuan (2020), starting from the perspective of trust, finds that customers' trust in other customers can improve their perceived value and lead to higher purchase intention. In addition, other customer perceptions can influence customers' brand preference through satisfaction. Research on other customer misbehavior focuses on its negative impact on customer emotional behavior. Zhang Shengliang and Li Xiaoxin (2014) studied problem customers and other customers, and pointed out that enterprises adopt two forms of blacklisting and indulgence to treat problem

customers, which will affect the emotions and behaviors of other customers. Under laissez-faire management measures, other customers will have higher negative emotions and negative behaviors toward enterprises [19]. Some scholars have also studied the internal mechanism of other customers' civic behaviors such as dissuading and doing good deeds in the face of customer misconduct [20]. Martin (1996) studied the anthems of customer satisfaction and dissatisfaction events (Grove and Fisk, 1997) and found that other customers caused more dissatisfaction events than satisfaction events.

3.4.3 Research on Other Customers in the Online Servicescape

In offline shopping or servicescape, customers have more face-to-face contact with customers, even if there is no direct communication, the presence of others itself can produce an influence. In online virtual shopping or servicescape, customers can observe other people's behaviors through mobile terminals or clients less than offline ones, and the most studied scenario is the interaction between customers in virtual communities. There was a small amount of research on the live stream. Based on social presence theory and social exchange theory, Wang Jiangzhe et al. (2017) found that each dimension of online servicescape positively affects customer citizenship behavior [21]. Gong Yanping and Liang Shulin (2015) discussed that in the scenario of online group buying, social factors can promote the positive emotions of customers and thus stimulate the intention of group purchasing. Other customer studies in live streaming situation focus on danmaku. For example, Zhou et al. (2019) studied the role of audience social interaction in paying and giving on live streaming platforms, and the stimulus related to danmaku include the presence of others, social competition and emotional stimulation [22].

4. Customer's Engagement Intention

4.1. Definition of Engagement Intention

Engagement first appeared in psychological research and was gradually applied to the field of management. Engagement refers to an individual's subjective tendency to engage in a specific action. Cermak et al. (1994) pointed out that Consumer Engagement refers to specific spiritual and material behaviors related to service production and delivery, as well as the degree of effort and involvement [23]. Silpakit and Fisk (1985) argue that customer engagement is a multidimensional concept, including customers' mental, intellectual, physical and emotional efforts and input. Vivek (2009) regards customer engagement as a core concept in the marketing system, and defines it as the degree of customer engagement, connection and investment in production, products, services and activities. Islam and Rahman (2017) proposed that customer participation refers to the behavior that customers are willing to interact with and participate in a certain object, which may be brands, organizations, websites, etc. [24].

Intention refers to the tendency of an individual to perform a certain behavior, which is an important predictor variable of behavior and is directly proportional to the behavior. The higher the intention, the greater the possibility of producing the behavior. Some scholars pay attention to customer engagement behavior. For example, Van Doorn et al. (2010) defined engagement according to specific action types or patterns of customers [25]. Lee et al. (2018) defined user engagement as liking, commenting, sharing and clicking when studying social media user engagement [26]. In the study of virtual community, scholars pay more attention to the value co-creation in the process of user engagement, which mainly includes Posting, browsing, etc. (Koh and Kim, 2007). In the question-and-answer community, knowledge sharing behavior can replace engagement behavior.

In the context of live e-commerce, customer engagement behaviors includes viewing, browsing, liking, commenting, tipping, purchasing and other aspects. For example, Wei Hua et al. (2021) divided it into active engagement behaviors (such as active inquiry, sharing, liking, etc.) and passive engagement behaviors (such as watching) [27]. Yu Xin and Xu Zhengliang (2017) defined user information engagement behavior in live streaming as the behavior of information interaction between viewers and co-viewers through danmaku. Based on the actual situation and existing

research, this paper defines customer's engagement intention in the context of live streaming e-commerce as the possibility that customers are willing to participate in various activities in the live streaming room, including the intensity of their thoughts on such activities as "like", "comment", "reward" and "purchase".

4.2. Classification and Measurement of Engagement Intention

4.2.1 Classification of Engagement Intention

The classification of customer engagement in existing literatures is mostly based on specific behaviors or engagement degree. According to the differences in research situations and problems, scholars have different views, as shown in Table 4. Ennew and Binks (1999) put forward the commonly used classification method, which divides customer engagement into information sharing, responsible behavior and interpersonal interaction. In the virtual brand community, according to the content of engagement, it can be divided into browsing, Posting, interaction and creation. According to the degree of engagement, it can also be divided into initial participation, actual participation and continuous participation. When studying customers' engagement intention continuously, Zhao Wenjun et al. (2017) argued that it should include two aspects: intention to consume continuously and intention to contribute continuously. According to the classification of customer behavior style, a few scholars believe that customer engagement can be divided into three types: social, task and contribution.

Table 4. Classification of customer engagement

Scholars (year)	Research situation	Classification
Ennew and Binks (1999)	services	Information sharing, responsible behavior, human interaction
Chen and Raab (2014)	Service remediation	Information engagement, behavior engagement and attitude engagement
Zhao Wenjun et al. (2017)	Community question and answer platform	Continuous intention to consume, continuous intention to contribute
Dessart (2015)	Social media	Cognition, emotion, behavior
Deb et al. (2017)	Mobile short video platform	Browsing behavior, interacting behavior, and creating behavior
Daibao et al. (2018)	social networking site brand homepage	Initial engagement, actual engagement, and ongoing engagement
Wang Shaoying (2021)	Live performance	"Content-oriented" participation intention (viewing intention, sharing intention), "Form oriented" participation intention (interaction intention, consumption intention)
Wang Shiyu (2022)	E-commerce live broadcast	Active engagement and passive engagement
Cambra-Fierro (2013)	Mobile communication	Transactional behavior, non-transactional behavior
Zhou Li (2023)	E-commerce live streaming	Spectator engagement, discourse engagement and action engagement
Zhang Yuexian and Wang Jiachen (2023)	Online shopping situation	Transactional and non-transactional behaviors (discover, search, engage in interaction, purchase, use, share recommendations, repeat consumption)

There is still controversy among scholars as to whether buying is a kind of engagement. The groundbreaking article of Van Doorn et al. (2010) points out that customer engagement is motivated by behaviors related to brands and companies other than purchasing, including word-of-mouth, recommendation, review and other behaviors. Liu Siqiang et al. (2014) believe that buying develops

on the basis of engagement, and buying must be based on trust, while engagement is not necessarily the case, so purchasing intention is the next step of engagement intention. However, recent studies have expanded the connotation of customer engagement, arguing that customer engagement should also include money, transactions and other behaviors (such as reward and purchase) [28]. For example, Ma Mengyao (2021) used interaction intention and purchase intention to measure user engagement intention, and Zhang Ning et al. (2018) argued that user engagement in virtual communities includes various behaviors such as purchase, knowledge sharing, continuous use and value co-creation. Lin et al. (2021) also pointed out that engagement includes not only activities such as likes and comments, but also monetary contributions such as rewards [29]. Cambra-Fierro (2013) believes that customer engagement includes not only transaction behaviors such as purchase, but also non-transaction behaviors such as word-of-mouth recommendation [30].

This paper believes that purchasing is also a kind of engagement, and in the live streaming situation, interaction, comment, purchase and other behaviors are intertwined, and cannot be clearly separated in time. This paper divides customer engagement from the perspective of behavior, adopts the classification method of Cambra-Fierro (2013), and divides customer's engagement intention in the context of live e-commerce into non-transactional engagement intention and transactional engagement intention, showing different levels of engagement. The former refers to the possibility of customers' time, energy and other non-monetary engagement in the live streaming (such as likes, comments, etc.), while the latter refers to the possibility of customers' engagement in the live broadcast in the form of payment, including rewards, purchases, etc. Since watching itself is a kind of engagement, the non-transactional engagement studied in this paper emphasizes the behavioral intention other than watching.

4.2.2 Measurement of Engagement Intention

Based on different classification methods, scholars have different measures of customer engagement intention. The customer engagement scale given by Ridings et al. (2002) in the study of virtual community has been adopted by many scholars [31]. Liu Siqiang et al. (2014), referring to the scale by Ridings et al. (2002), measured engagement intention with items such as "willing to continue to pay attention to and query relevant information of this website" and "willing to recommend this website to relatives and friends". Many scholars use Dodds et al. (1991)'s scale of purchase intention [32] to measure customer engagement intention (Yu Zhenpeng et al., 2022; Fan Jun et al., 2021 et al.). This paper holds that engagement intention can be appropriately modified according to live streaming situations by referring to scales such as Ridings et al. (2002) and Dodds et al. (1991). The specific content is shown in Table 5.

Table 5. Measurement of customer engagement intention

Dimensions	Measurement items	Sources
Non-transactional engagement	1. I would like to continue to follow this live streaming room.	Ridings et al. (2002), Dodds et al. (1991)
	2. In the process of watching the live streaming, I am willing to give "like" to the live streaming room.	
	3. I am willing to communicate with the anchor/other customers by sending danmaku while watching the live streaming.	
	4. In the process of watching the live streaming, I am willing to share the products in the live streaming room or the live streaming room with customers.	
Transactional engagement	1. In the process of watching the live streaming, there is a high possibility that I will give a reward to the live streaming room.	
	2. In the process of watching the live streaming, I have a high possibility to buy the products of the live streaming room.	
	3. In the process of watching the live streaming, I am willing to buy the products of the live streaming room.	

4.3. Research on Influencing Factors of Engagement Intention

Customer engagement has a positive impact on both enterprises and individuals. Research on brand communities shows that engaged customers show higher levels of satisfaction, loyalty, trust and commitment. For businesses, customer engagement can improve profitability (Voyles, 2007). In view of the important value of customer engagement, many scholars have explored what factors can promote customer's engagement intention or engagement behavior. From the customer's own point of view, the customer's personal characteristics, demand preferences, etc. are the antecedents of engagement. Islam and Rahman (2017) studied the prediction of personality factors on customer engagement and pointed out that extroversion is the biggest driving force for customer engagement in online brand community, followed by openness, neuroticism and agreeableness.

Customer engagement is discussed more in virtual community, such as from the perspectives of perceived value, perceived usefulness, trust and satisfaction. Zhao Wenjun et al. (2017) pointed out that information value, social value and emotional value can affect customers' perceived usefulness and satisfaction, and satisfaction can affect their engagement intention. Liao Junyun et al. (2019) found that the information value and social value of brand community have a significant positive impact on customer engagement intention [33]. Ashley et al. (2015) also pointed out that information appeal can motivate customers to engage. In addition, the strength of the relationship with the brand also drives customer engagement in the community.

In other situations, the perspective of customer engagement intention is similar. In the study of online word-of-mouth, some scholars pointed out that social capital, homogeneity, trust and interpersonal influence are significantly correlated with users' engagement in online word-of-mouth communication. Zhang Yangyi et al. (2018) found that in the context of paid onlookers on social platforms, the characteristics of opinion leaders (visibility, professionalism, homogeneity) would affect the onlookers' continuous engagement intention. In terms of advertising content strategies, infotainment, customer feedback and sweepstakes can all engage customers cognitively and emotionally to comment or share. The inclusion of informative content such as price in advertising alone decreases customer engagement, but when combined with brand personality-related attributes, it increases engagement (Lee, 2018). Tsai and Men (2013), when studying brand social networking sites, pointed out that customer engagement factors include quasi-social interaction, perception source feasibility, social identity and relationship orientation. In social commerce, technical features affect the virtual experience of customers and thus their engagement intention.

In the situation of live streaming, relevant studies have explored what factors promote customer engagement. Chen Yingxin et al. (2022) gave a comprehensive overview of three types of factors that affect customers' engagement in live streaming: physical-rational-human rationalization, including seven aspects such as pleasure needs, information needs, social needs, policies and laws, and emotional resonance [35]. The greater the number of participants, the stronger the customer's engagement intention, and the transaction tendency and self-construction type play a moderating role [36]. From the perspective of relationship, social bond, structural bond and financial bond all have a direct impact on customer engagement [37]. The stronger the quasi-social relationship viewers perceive, the more likely they are to continue watching live streaming [38]. Wongkitrungrueng et al. (2022) found that customers' perceived value (symbolic/utilitarian/hedonic) affects their engagement through perceived trust [39]. Information Interaction in live streaming (Wei Hua et al., 2021; Yu Xin et al., 2017) and interactive experience will affect users' engagement behavior. Anchor characteristics (emotion, behavior, language, etc.) will positively affect the intention to continue watching, the intention to tip (Li et al., 2021) and the intention to purchase (Liao et al., 2021). Zhang Jieqiong et al. (2022) verified that social presence positively affects users' continuous use and recommendation intention through user commitment.

5. Influence of Other Customer Cues on Customer's Engagement Intention

In the theory of servicescape, other customers influence customers as part of social cues, and studies have proved the important value of the existence of other customers. In live streaming, the presence of customers is a topic that cannot be ignored. Customers are an important element of live streaming scenes. Previous studies focused on the role of anchors (service staff) in live streaming, but less discussed the value of customer presence. In practice, other customers, as external stimuli in the live streaming, will also affect the customer's behavioral response. When customers enter a new streaming room, they do not know the anchor and brand, and more rely on the behavior of other customers in the broadcast room to make decisions. Other customer clues are symbols and factors related to other customers with specific social significance in the live broadcast. Based on the above, this paper divides other customer leads in the context of live streaming e-commerce into three dimensions: usefulness, interactivity and visibility. Cai (2018) pointed out that there are two kinds of motivations for viewers to watch live broadcast: hedonic and utilitarian. Customers expect these needs to be satisfied when watching live streaming. If satisfied, they will continue to watch live streaming and pay more in live streaming. Argo et al. (2005) studied the influence of pure social presence on customers' emotions and behaviors in the retail context. Tombs and McCol-kennedy (2013) confirm that even if there is no direct interaction between customers, the emotions of other customers can infect customers [40]. This paper holds that other customer cues have a positive effect on customer engagement intention.

In terms of usefulness, reliable information provided by other customers as an external stimulus will lead customers to approach behavior. Danmaku is a tool for customers to speak freely, which can reflect their judgment and evaluation, and is also an important basis for them to make decisions. Gao et al. (2021) conducted a study using the ELM model and believed that the consistency and participation of co-viewers are peripheral cues that help customers make decisions and affect customers' perception of persuasive information, thus leading to changes in their behavioral intentions [41]. Through the live streaming interface, customers observe the behaviors and comments of other customers and obtain valuable content, such as opinions and evaluations of anchors and products, to reduce the uncertainty in purchase and help customers make better decisions [42]. Therefore, the higher the usefulness of other customers, the higher the positive evaluation generated by customers, and the stronger their willingness to participate in live events.

In terms of interaction, live streaming is obviously interactive. Previous studies have found that good interaction between customers and anchors and other customers is conducive to the establishment of emotional bonds. Stimulated by this atmosphere, customers are easily influenced to produce purchasing behaviors [43]. From the perspective of information interaction, Wei Hua et al. (2021) found that mutuality can significantly affect customer participation behavior. Other customers is the basis of the live streaming room to create a warm atmosphere, provide important clues for the customer. When other customers actively participate in the live streaming room, it shows that the environment is good, and customers believe that the live broadcast room is worth investing in. Xue et al. (2020) proved that the real-time interaction of social e-commerce live streaming will positively affect the perceived usefulness and further promote social commerce engagement [44]. Gao Xiayuan et al. (2021) proved that mutual assistance shown by co-viewers can significantly promote audience's purchase behavior. Zhou et al. (2019) also found that the more danmaku there are in the live streaming room, the more customers will give rewards. This behavioral response of other customers can provide customers with information, social and emotional cues [45]. The interaction between other customers, helping each other or the interaction between other customers and the anchor can make customers feel immersive and authentic. The reactions and emotions of other customers affect customers. Customers think that the atmosphere of the broadcast room is good and their participation is welcome, so they are willing to respond with positive behaviors, including continuing to watch, participating in interaction, and further purchasing.

In terms of visibility, the content of live streaming interface design and display is very rich, and customers can get a lot of information from it, that is, customers can obtain product-related knowledge

and some inspiring clues to assist decision-making. A good shopping environment stimulates customers' positive evaluation, improves their satisfaction, prolongs their stay, induces customers' approaching behavior, and affects customers' response to the servicescape. Rosenbaum et al. (2007) found that customers' support from other customers can improve their voluntary performance [46]. Liu et al. (2013) pointed out that visual attraction can influence impulse purchase by improving customers' satisfaction [47]. Zhang Baosheng et al. (2021) also pointed out that visibility has a positive impact on purchase intention. The civic behavior of other customers will promote the civic behavior of customers [48]. In the live streaming, other customers' behavior (interaction, purchase, etc.) may also prompt customers to take similar behavioral feedback.

6. Summary and Prospect

Live streaming e-commerce has attracted much attention due to its characteristics of real-time, interaction, entertainment and visibility. Previous studies focused on the impact of live streaming features, platform features, technical features and anchor features on customer behavior, and discussed the internal mechanism and boundary conditions of the impact, without sufficient exploration of other customers. According to the theory of servicescape, other customers are an important part of the servicescape and will have a significant impact on customers. This paper focuses on the influence of other customer clues in live streaming on customer's engagement intention, and sorts out relevant studies. This paper divides other customer cues into three dimensions: usefulness, interactivity and visibility, and divides customer's engagement intention into non-transactional engagement intention and transactional engagement intention. In the context of live streaming e-commerce, other customers are factors that cannot be ignored. When customers enter an "unknown" live broadcast room and do not know the anchor and brand, the behavioral clues of other customers in the live streaming room are important sources of information. Customers can make their own judgments and decision-making behaviors from all kinds of information displayed on the live streaming interface. In general, in the context of live streaming e-commerce, the three dimensions of usefulness, interactivity and visibility of other customer cues have a positive impact on customers' engagement intention in non-transaction forms and transaction forms. The more effective the information sent by other customers in the danmaku, the higher the frequency of interaction, and the richer the behavior shown, the more it can promote customers to participate in all kinds of live activities.

The relevant researches on other customers are mainly distributed in the offline situation, and the researches on the online service environment are not enough. Online consumption, especially live shopping, has become the main shopping mode of consumers. In view of the important role of other customers, it is valuable to expand the researches on other customers in the online environment. Previous studies on live streaming paid more attention to the influence of anchors as a social element in servicescape, and did not discuss enough about people who watched live broadcasts together. Other customers were also one of the main bodies of the live streaming room, which would have an important impact on customer behavior. Future studies may explore the internal mechanism and boundary conditions of other customer cues affecting customer behavior, for example, to verify the influence of other customer cues on customer engagement intention through identity. In addition to the positive impact, other customers' behavioral cues will also have a negative impact on customers. Future studies can also focus on the negative impact of other customers' comments in live streaming, such as whether other customers' complaints and negative evaluations will reduce customers' trust and purchase. In addition, in terms of research methods, current studies mostly use scales to measure variables and verify the relationship between them, which may be different from the real situation. In the future, more experimental methods can be used for research, or real data from live broadcast can be collected for analysis.

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