

Influence of Streamer Characteristics on Consumer Loyalty in E-Commerce Live Streaming Mediated by Consumer Trust and Consumer Satisfaction

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Abstract

The objective of this study is to investigate the impact of streamer characteristics specifically professionalism, attractiveness, and interactivity on consumer trust, consumer satisfaction, and consumer loyalty. To achieve this, a structural equation model (SEM) was constructed and tested using data from a survey of 459 Chinese consumers with live streaming experience, analyzed with SEM statistical software. The results indicate that: (1) Streamer professionalism, attractiveness, and interactivity positively influence consumer trust and consumer satisfaction, which, in turn, positively impact consumer loyalty. Notably, the effects of streamer professionalism, attractiveness, and interactivity on consumer satisfaction (path coefficients: 0.251, 0.281, 0.323) are greater than their effects on consumer trust (path coefficients: 0.214, 0.206, 0.198). (2) Consumer trust and consumer satisfaction mediate the relationship between streamer characteristics and consumer loyalty. Additionally, consumer trust mediates the relationship between consumer satisfaction and consumer loyalty. (3) The hypothesized relational model established in this study was validated using a structural equation modeling fit test, with the overall model fit found to be good: Chi-square=493.885, $df=449$, Chi-square/ $df=1.100$, GFI=0.937, NFI=0.953, AGFI=0.926, RMSEA=0.015. The findings reveal that streamer professionalism, attractiveness, and interactivity play a positive role in enhancing consumer trust, consumer satisfaction and consumer loyalty, enriching research on streamer characteristics and consumer behavior in the live streaming industry, that provide to companies for selecting streamer, effectively promoting the improvement of live streaming efficiency, and advancing the sustainable development of the e-commerce live streaming to build sustainable consumer confidence in the future.

Keywords: Streamer characteristic, Consumer trust, Consumer satisfaction, Consumer loyalty

Introduction

The China Internet Network Information Center (CNNIC) released the 53rd "Statistical Report on Internet Development in China" in Beijing, showing that as of December 2023, the number of internet users in China reached 1.092 billion, with an internet penetration rate of 77.5% (Cyberspace Administration of China, 2024, March 25). With the spread of the internet,

the number of internet users in China has increased sharply, and people's demand for diverse and personalized lifestyles and consumption patterns has grown stronger. Against this background, new business models such as social e-commerce and live-stream shopping have continuously emerged (Luo, et al., 2021). E-commerce live streaming, which involves real-time video interaction with consumers and selling products, has begun to boom (Zhou & Lou, 2024), becoming an important driver of revenue for traditional e-commerce platforms (www.100ec. cn, 2023, March 23), and the mainstream of e-commerce (Tian, et al., 2023).

Notably, competitions among live streamers have become increasingly fierce as more newcomers are marching in. To survive and thrive in the cut-throat market competitions, it is key for them to increase consumers' repeat purchase rate and win customer loyalty (Chen, et al., 2020). It is well-known that customer loyalty is one of the main factors in enhancing market competitiveness and sustainable competitive advantage (Purwanto & Juliana, 2022; Purba, et al., 2022). For live streaming rooms, platforms, and enterprises, it is crucial to determine how to retain viewers and improve their loyalty to these live media (Al-Ayed, 2022; Liu,et al., 2024).

Previous research has emphasized the importance of e-loyalty in the success of e-commerce companies. Some scholars have found that providing high-quality electronic services can enhance consumer satisfaction and trust, thereby increasing consumer loyalty (Muharam, et al.,2021; Leon & Dixon, 2023; Ashiq & Hussain, 2024). Additionally, other scholars suggest that perceived value affects trust and satisfaction, which in turn influences loyalty (Pratiwiet al., 2021; Alkufahy et al., 2023). Furthermore, researchers have explored the impact of brand image on trust, satisfaction, and loyalty (Diputra & Yasa, 2021; Huang, et al., 2020).

As the only performer of the live stream, some of the streamers' characteristics may directly decide whether consumers are willing to watch their live streams or purchase the products they promote(Guo et al., 2022)..Though a few researchers have emphasized the importance of streamers (Hou et al., 2020; Park & Lin, 2020), they did not delve into the role of streamers' specific characteristic plays in gaining a celebrity status and enhancing consumers' behavioral intentions.

Therefore, this paper investigate the impact of streamer characteristics on consumer trust, consumer satisfaction, and consumer loyalty, hope to provide valuable insights for companies in selecting streamers and enhancing live streaming efficiency.

Objectives of the study:

1. To investigate the direct influence of streamer characteristics (professionalism, attractiveness, and interactivity) on consumer trust.
2. To investigate the direct influence of streamer characteristics (professionalism, attractiveness, and interactivity) on consumer satisfaction.

3.To investigate the direct influence of consumer trust and consumer satisfaction on consumer loyalty.

4.To investigate the mediating effect of consumer trust and consumer satisfaction between streamer characteristics and consumer loyalty.

Literature Review

streamer characteristic

Streamers characteristics refer to the appearance, personality, professional knowledge and other characteristics of the anchor. In e-commerce live broadcasting, the characteristics of the streamer may affect the purchase decision of the audience(Liu & Wu, 2022). Zheng et al.(2023) believes that e-commerce streamers play the role of opinion leaders. With the help of relevant research results of opinion leaders, their characteristics are divided into three dimensions: popularity, professionalism and product involvement. Liu & Wu (2022) based on the qualitative research of grounded theory, divided e-commerce streamers into four attributes: charm attribute, recommendation attribute, display attribute and interaction attribute. Geng (2020), based on the theory of psychological arousal, divided the characteristics of streamers into professionalism, credibility, attractiveness and interactivity (Gong et al., 2020).

Thus, it is evident that there is no consensus in the academic community on the dimensions for measuring streamer characteristics. Based on existing research, this study categorizes streamer characteristics into three dimensions: professionalism, attractiveness, and interactivity. Professionalism is defined as a high-level skill or knowledge, in which streamers provide instructive consumption information and have professional levels (extensive experience) in recommending products. Consumers are more inclined to interact with streamers who have rich knowledge of brands and products(Lee & Chen, 2021). Attractiveness refers to whether consumers think the live streamer is attractive based on personal style, appearance, and unique personalities that possibly exist.Live streamers' attractive appearance and personality can greatly improve consumer satisfaction, significantly impacting the stickiness, and thus positively influence consumer loyalty(Meng & Lin, 2023). Interactivity is the behavior and activity of a live streamer to eliminate consumer doubts and issues, enhance their shopping experience, and communicate with consumers during the live stream process(Li et al., 2024).

consumer trust

Trust is considered the intention of a person to have confidence in a transaction partner and consider it reliable(Meng & Lin, 2023), also is one of the main factors that promote purchase (Lăzăroiu et al., 2020). In this study, consumer trust is a positive willingness exhibited by consumers towards the streamer, based on their understanding and perception of the streamer, trust the streamer will conscientiously fulfill their obligations during the transaction process, safeguarding and protecting consumer rights. Trust has been recognized as a driving factor in e-commerce or s-commerce setting (Alalwan et al., 2017), but still relatively little

attention has been paid to unveil how trust develops and its role in live streaming commerce. The unpredictable environment due to the lack of face-to-face communication is the main reason why previous e-commerce/s-commerce studies have explored the mechanism of trust formation (Gefen & Straub, 2003; Kim & Park, 2013). Factors such as social support, information quality and social presence (Chen & Shen, 2015; El Amri & Akrouf, 2020) have been proved to be able to help sellers gain customers' trust. Conversely, with the introduction of live streaming, the real-time interaction enables customers to visualize real products and sellers, thus avoiding the risks caused by the opacity of transactions in traditional e-commerce. However, whether the antecedents of trust have changed in this new context and how it affects subsequent behavior is still unknown in live streaming commerce.

consumer satisfaction

In e-commerce live streaming, consumer satisfaction refers to the satisfaction of consumers with the purchased products, the services provided by the streamer, and the entire shopping process. satisfaction was defined by Oliver (2014) as the consumer's fulfillment response, the degree to which the level of fulfillment is pleasant or unpleasant. If consumers believe that the performance of a particular commodity or service meets their expectations, they are likely to be satisfied (Suhartanto et al., 2019). Scholar Rao et al. (2021) state that satisfaction is defined as how a consumer is pleased with a particular brand or view about a product/service that matches requirements.

Consumer happiness is critical for any business's growth, as satisfied customers promote positive word of mouth about the business, thereby reinforcing the consumers' intent to revisit (Cakici et al., 2019). On the other hand, unsatisfied consumers are viewed as a serious danger to commercial enterprises (Cakici et al., 2019). Satisfied customers are more likely to repurchase or experience the product or service in the future and to promote it to others (Suhartanto et al., 2018).

consumer loyalty

In this study, loyalty refers to the psychological or emotional attachment consumers develop towards the streamer, where they continue to follow and choose the streamer and repeatedly purchase the recommended products, even in the face of unfavorable conditions such as higher prices or absence from live streams. Consumer loyalty is a critical determinant of the success of e-commerce companies, as it directly influences repurchases and recommendations for company products (Juwaini et al., 2022). Providing high-quality services that foster consumer satisfaction and trust is essential for e-commerce companies, as these factors are instrumental in developing loyal customers. According to Purwanto & Juliana (2021) and Purba et al. (2021), consumer loyalty significantly enhances market competitiveness and provides a sustainable competitive advantage. Retaining existing customers is far more cost-effective than acquiring new ones (Choi & Mai, 2018). Therefore, managing a loyal customer base is crucial for e-commerce companies, as long-term customer relationships not only contribute substantially to profits but also have the potential to significantly increase future

sales volumes (Della Prisanti, 2017).

The impact of streamer characteristics on consumer trust

Li et al.(2024) found that streamer attractiveness and professionalism significantly enhance consumer trust. The appearance and reputation of a streamer contribute to positive initial impressions, while professional credentials displayed via live streaming technology further establish trust by showcasing the streamer's expertise. Ma et al. (2022) added that interactivity, although not directly impacting trust, enhances it indirectly through social presence. Frequent interactions between consumers and streamers create a warm, humanizing atmosphere, improving the service experience and subsequently boosting trust. Moreover, while professionalism doesn't directly affect social presence or psychological distance, it has a direct positive impact on trust, highlighting the critical role of a streamer's expertise and conduct in fostering consumer trust. Based on the above researches, the following research hypotheses is proposed:

H1a:Professionalism is positively affecting consumer trust.

H1b:Attractiveness is positively affecting consumer trust.

H1c:Interactivity is positively affecting consumer trust.

The impact of streamer characteristics on consumer satisfaction

Chen et al.(2020) validated that streamer professionalism has a positive impact on consumer satisfaction. In the same way, Scholar Meng & Lin (2023) believes that more professional live streamers are more likely to arouse positive emotions of the audience towards themselves and the live-streaming contents. Söderlund et al.(2009) show that a high level as opposed to a low level of physical attractiveness of the service worker produced a higher level of customer satisfaction. In addition, the results indicate that exposure to an attractive service worker set in motion a process in which an attractiveness appraisal affected the attitude toward the service worker, which in turn had a positive impact on customer satisfaction. Li et al. (2021) indicate that in Digital Social Reading human to human and human to text interactivity positively predicts user's satisfaction. Based on the above researches, the following research hypotheses is proposed:

H2a:Professionalism is positively affecting consumer satisfaction.

H2b:Attractiveness is positively affecting consumer satisfaction.

H2c:Interactivity is positively affecting consumer satisfaction.

The impact of consumer trust and consumer satisfaction on consumer loyalty

Extensive research has demonstrated the significant role of consumer trust and satisfaction in fostering consumer loyalty. Kalia et al. (2021) emphasize that trust is crucial for enhancing customer loyalty and facilitating value creation. This assertion aligns with the findings of Alkhurshan & Rjoub (2020), who highlighted trust as a fundamental factor in strengthening customer loyalty. Cheng & Jiang (2020) further corroborate this by demonstrating that user satisfaction positively affects customer loyalty. Their data indicate that satisfied users are more likely to remain loyal, underscoring the direct positive relationship between

satisfaction and loyalty. Thamrin et al. (2020) utilized questionnaires and analyzed the data using Partial Least Square Structural Equation Modeling (PLS-SEM). Their findings reveal that trust, satisfaction, and perceived value all have a positive effect on loyalty. This comprehensive analysis underscores the importance of these factors in building and maintaining consumer loyalty. Additionally, Hendrawan & Agustini (2021) found that e-satisfaction significantly and positively impacts e-loyalty. Their research highlights the importance of ensuring consumer satisfaction in digital environments to cultivate long-term loyalty. Based on the above researches, the following research hypotheses is proposed:

H3: Consumer trust is positively affecting consumer loyalty.

H4: Consumer satisfaction is positively affecting consumer loyalty.

The mediating effect of consumer trust and consumer satisfaction between streamer characteristics and consumer loyalty

The role of consumer trust as mediators in the relationship between various antecedents and consumer loyalty has been widely studied in the literature. Cheng & Jiang (2020) emphasize that trust serves as both a direct measure and a powerful mediator of consumer loyalty, with higher trust in one service provider leading to decreased loyalty to another (Nelson & Kim, 2021). This strong correlation between consumer loyalty and trust is further corroborated by multiple studies (Purwanto et al., 2020). Tijjangan et al. (2023) highlight the direct effect of brand trust in mediating the relationship between consumer satisfaction and loyalty. This suggests that when consumers trust a brand, their satisfaction with the brand translates more effectively into loyalty. Additionally, Cheng & Jiang (2020) identify user satisfaction as a significant mediator between gratifications and consumer outcomes, indicating that satisfied consumers are more likely to develop loyalty. Based on the above researches, the following research hypotheses is proposed:

H5a: Consumer trust plays a mediating role between professionalism and consumer loyalty.

H5b: Consumer trust plays a mediating role between attractiveness and consumer loyalty.

H5c: Consumer trust plays a mediating role between interactivity and consumer loyalty.

H6a: Consumer satisfaction plays a mediating role between professionalism and consumer loyalty.

H6b: Consumer satisfaction plays a mediating role between attractiveness and consumer loyalty.

H6c: Consumer satisfaction plays a mediating role between interactivity and consumer loyalty.



Framework

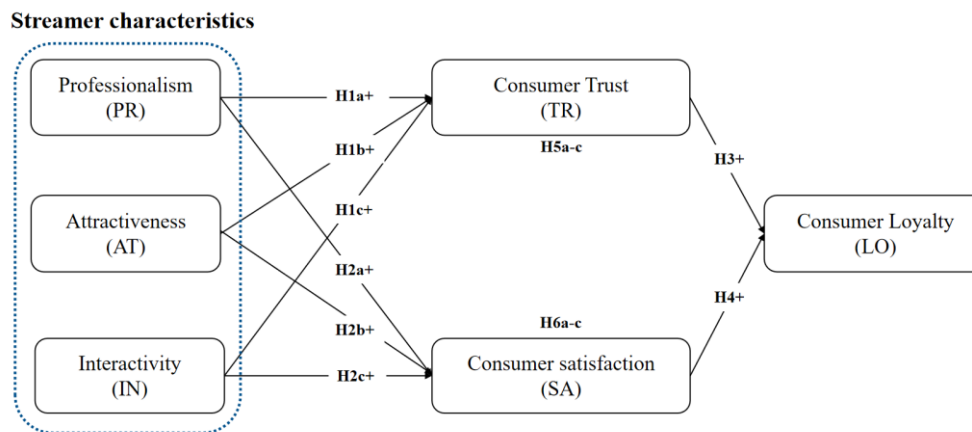


Figure 1. A conceptual framework for this research

Research methodology

Research design

This study employed a quantitative research design to examine the influence of streamer characteristics on the consumer trust, consumer satisfaction and consumer loyalty of e-commerce live stream in China. A structural equation model (SEM) was constructed and tested using data from a survey of Chinese consumers with online live streaming experience, analyzed with SEM statistical software.

Population and Sample

According to the 53rd "Statistical Report on Internet Development in China" released by the China Internet Network Information Center (CNNIC) in Beijing, the scale of e-commerce live streaming users in China is 597 million (Cyberspace Administration of China, 2024, March 25). Bentler & Chou (1987) proposed that the sample size should be based on the number of observed variables, typically ranging from 5 to 20 times the number of observed variables. With 32 observed variables in this study, a sample size of 459 is sufficient.

Measurement Tools

The questionnaire items for social presence and trust are based on Gefen & Straub (2003). This study employed a five-point Likert scale, divided into five sections. The first section included screening questions to select study subjects, the second section consisted of multiple-choice questions to investigate the basic characteristics of consumers, and sections three to six included scale questions regarding streamer characteristics, consumer trust, consumer satisfaction, and consumer loyalty. After designing the questionnaire, the initial draft was sent to three experts for Item Objective Congruence (IOC) testing, retaining items with an IOC score greater than or equal to 0.67 (Rovinelli & Hambleton 1976). A pre-test was then conducted with 89 consumers, and the Cronbach's alpha value for each item was greater than 0.8. Therefore, the questionnaire was confirmed to be valid and reliable.

Data Collection

To ensure the accuracy and objectivity of data collection, the survey targeted consumers with live shopping experience who followed or liked specific streamers. A total of 550 online questionnaires were distributed using random sampling, and 511 were returned. Out of these, 23 questionnaires were discarded due to being completed in less than one minute, and 29 were excluded due to evident errors in the responses. Consequently, 52 invalid questionnaires were removed, resulting in 459 valid responses, yielding an effective response rate of 89.82%.

Data Analysis Method

This study employed structural equation modeling (SEM) to test the research hypotheses, primarily through descriptive analysis, factor analysis, path analysis, and mediation effect analysis to examine the relationships between variables. First, the descriptive statistics, including frequency and percentage, were used to analyze the basic characteristics of the surveyed consumers. Second, reliability tests were conducted on all scale items, followed by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Next, the AMOS software was used to perform SEM analysis on the sample data to verify the research hypotheses and analyze the relationships between variables. Finally, the bootstrap method was employed to test the mediation effects.

Research Results

Descriptive analysis

The characteristics of the respondents in the 459 valid questionnaires are shown in Table 1.

Table1 Statistical analysis of personal information characteristics (n=459)

Measure	Value	Frequency	Percentage (%)
Gender	Male	148	32.2
	Female	311	67.8
Education	High school or below	17	5.0
	Associate degree	85	25.1
	Bachelor's degree	188	55.6
	Master's degree or above	48	14.2
Age	Under 18 years	3	0.9
	18-29 years	190	56.2
	30-45 years old	123	36.4
	46-60 years old	19	5.6
Occupation	Over 60 years old	3	0.9
	Student	130	38.5
	Teacher/Scientist	92	27.2

Measure	Value	Frequency	Percentage (%)
Income	Company employee	63	18.6
	Government employee	26	7.7
	Self-employed	22	6.5
	Other	5	1.5
	<3000 yuan/month	115	34.0
	3001-6000 yuan/month	126	37.3
	6001-9000 yuan/month	62	18.3
	≥9001 yuan/month	35	10.4

Regarding gender, 67.8% of the respondents were female and 32.2% were male, indicating that the demand for live stream shopping is higher among females. In terms of education, 55.6% of the respondents had a bachelor's degree, suggesting that those with higher education levels are more likely to engage in e-commerce live streaming shopping. Age-wise, 56.2% of the sample were between 18-29 years old, and 36.4% were between 30-45 years old, indicating that the primary demographic for e-commerce live streaming is young to middle-aged adults. Regarding occupation, students comprised 38.5% of the respondents, while teachers and technical professionals made up 27.2%. This indicates that students have more time and curiosity to explore live stream shopping, and teachers and technical professionals are more interested in research and development trends in this area. In terms of income, 34.0% of the respondents had a monthly income below 3000 yuan, reflecting the lower income levels of students, 37.3% had a monthly income between 6001-9000 yuan, which aligns with the National Bureau of Statistics' report of the average decapitator disposable income in China being 39,000 yuan annually.

Measurement model

Table 2 presents the reliability measurements. All item factor loadings exceed 0.70, which exceeds the acceptable value of 0.5 (Hair et al., 1992). Consistent with Fornell (1982) recommendations, all composite reliabilities (CR) exceeded the threshold value of 0.7. The average variance extracted (AVE) for all constructs exceeded the benchmark of 0.5 recommended by Fornell & Larcker (1981). Since the three reliability values were greater than those recommended, the scales for measuring these constructs were deemed to exhibit satisfactory convergence reliability.

Table 2 Reliability and validity analysis

Variable	Items	Factor loading	Cronbach's Alpha	CR	AVE
Professionalism (PR)	PR1	0.885	0.923	0.900	0.643
	PR2	0.740			
	PR3	0.766			
	PR4	0.809			
	PR5	0.802			
Attractiveness (AT)	AT1	0.929	0.910	0.924	0.671
	AT2	0.779			
	AT3	0.795			
	AT4	0.810			
	AT5	0.793			
	AT6	0.799			
Interactivity (IN)	IN1	0.874	0.906	0.908	0.665
	IN2	0.810			
	IN3	0.773			
	IN4	0.778			
	IN5	0.838			
Consumer Trust (TR)	TR1	0.865	0.915	0.916	0.687
	TR2	0.850			
	TR3	0.823			
	TR4	0.766			
	TR5	0.838			
Consumer Satisfaction (SA)	SA1	0.870	0.899	0.911	0.631
	SA2	0.771			
	SA3	0.792			
	SA4	0.814			
	SA5	0.747			
	SA6	0.764			
Consumer Loyalty (LO)	LO1	0.912	0.899	0.902	0.65
	LO2	0.834			
	LO3	0.831			
	LO4	0.716			
	LO5	0.721			

Table 3 presents measurements for discriminant validity. The data reveal evidence of discriminant validity if the average variance extracted (AVE) is greater than the square of the construct's correlations with the other factors (Fornell & Larcker 1981), the value on the diagonals. This indicated that constructs are empirically distinct.

Table3 Discriminant validity

	PR	AT	IN	TR	SA	LO
Professionalism	0.802					
Attractiveness AT	0.371	0.819				
Interactivity IN	0.350	0.347	0.815			
Consumer Trust TR	0.458	0.454	0.451	0.829		
Consumer Satisfaction SA	0.465	0.482	0.506	0.517	0.794	
Consumer Loyalty LO	0.371	0.369	0.372	0.453	0.513	0.806

Note: Bold font is AVE square root

SEM model fitting test

After assessing reliability and validity, we tested the overall fit of the path model, which evaluates the correspondence of the actual or observed input matrix with that predicted by the proposed model. In this research, the path coefficient values as shown in table 4, the study yielded a Chi-square value is Chi-square=493.885, df=449, Chi-square/df=1.100 which is less than 3, meeting the standard. The GFI=0.937, NFI=0.953, AGFI=0.926, all exceeding 0.9. The RMSEA=0.015, RMR=0.035, which is below 0.05, indicated a good fit for all constructs (Hu & Bentler, 1999). Therefore, we were assured that the path diagram for the research model was an adequate representation of the entire set of causal relationships.

Table 4 Results of structural model fit testing

Indicators	Chi-square	df	Chi-square/df	GFI	NFI	AGFI	RMR	RMSEA
Results	493.885	449	1.100	0.937	0.953	0.926	0.035	0.015
Range of good model fit			<3	>0.9	>0.9	>0.9	<0.05	<0.05

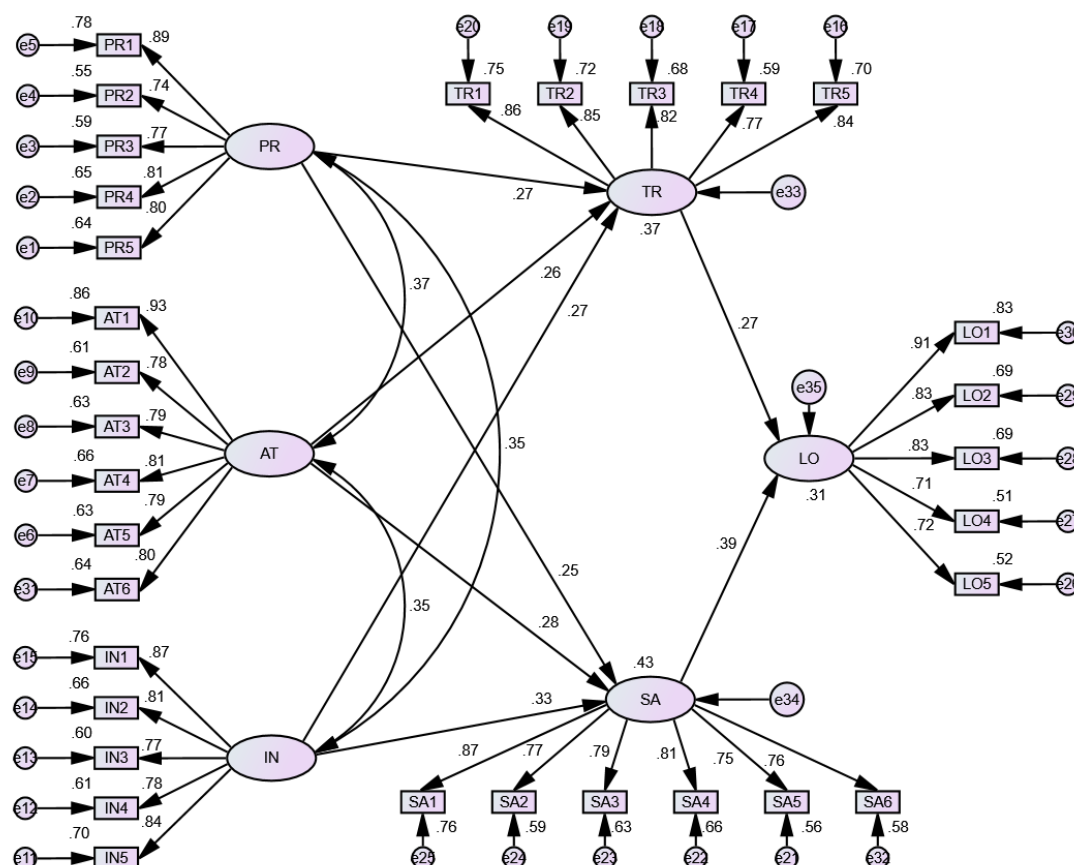


Figure 2 Structural equation model and path

Hypothesis Test

This study aims to investigate how streamer characteristics, including professionalism, attractiveness, and interactivity, influence consumer trust and consumer satisfaction, and subsequently, consumer loyalty through the construction of a structural equation model (SEM). Additionally, it examines the mediating role of consumer trust and consumer satisfaction between streamer characteristics and consumer loyalty. Therefore, the results of testing the structural model primarily include the main effects and mediation effects.

Table 5 Results of the main effects testing

Relationships			Path coefficients(β)	S.E.	C.R.	P	Results
H1a	TR<---	PR	0.272***	0.054	5.546	<0.001	supported
H1b	TR<---	AT	0.265***	0.053	5.488	<0.001	supported
H1c	TR<---	IN	0.271***	0.052	5.632	<0.001	supported
H2a	SA<---	PR	0.255***	0.045	5.307	<0.001	supported
H2b	SA<---	AT	0.280***	0.044	5.875	<0.001	supported
H2c	SA<---	IN	0.327***	0.044	6.771	<0.001	supported

Relationships			Path coefficients(β)	S.E.	C.R.	P	Results
H3	LO \leftarrow ---	TR	0.268***	0.039	5.329	<0.001	supported
H4	LO \leftarrow ---	SA	0.390***	0.049	7.230	<0.001	supported

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; two-tailed test.

H1a (PR \rightarrow TR): Professionalism has a significant positive impact on consumer trust ($\beta = 0.272$, $p < 0.001$). Therefore, H1a is supported.

H1b (AT \rightarrow TR): Attractiveness has a significant positive impact on consumer trust ($\beta = 0.265$, $p < 0.001$). Therefore, H1b is supported.

H1c (IN \rightarrow TR): Interactivity has a significant positive impact on consumer trust ($\beta = 0.271$, $p < 0.001$). Therefore, H1c is supported.

H2a (PR \rightarrow SA): Professionalism has a significant positive impact on consumer satisfaction ($\beta = 0.255$, $p < 0.001$). Therefore, H2a is supported.

H2b (AT \rightarrow SA): Attractiveness has a significant positive impact on consumer satisfaction ($\beta = 0.280$, $p < 0.001$). Therefore, H2b is supported.

H2c (IN \rightarrow SA): Interactivity has a significant positive impact on consumer satisfaction ($\beta = 0.327$, $p < 0.001$). Therefore, H2c is supported.

H3 (TR \rightarrow LO): Consumer trust has a significant positive impact on consumer loyalty ($\beta = 0.268$, $p < 0.001$). Therefore, H1a is supported.

H4 (SA \rightarrow LO): Consumer satisfaction has a significant positive impact on consumer loyalty ($\beta = 0.390$, $p < 0.001$). Therefore, H1a is supported.

Moreover, in addition to these verifications, the mediating effect was added to the model to explore the causal relationship between all latent variables. This study employed the bootstrap method to test the mediation effect, drawing 5000 bootstrap samples to estimate the 95% confidence interval. The test results are shown in Table 6.

Table 6 Results of mediate effects testing

Relationships		Path coefficients(β)	95% CI		P	Results
			Lower	Upper		
H5a	PR \rightarrow TR \rightarrow LO	0.105***	0.053	0.175	<0.001	supported
H5b	AT \rightarrow TR \rightarrow LO	0.102***	0.054	0.164	<0.001	supported
H5c	IN \rightarrow TR \rightarrow LO	0.102***	0.057	0.166	<0.001	supported
H6a	PR \rightarrow SA \rightarrow LO	0.143***	0.082	0.224	<0.001	supported
H6b	AT \rightarrow SA \rightarrow LO	0.157***	0.098	0.234	<0.001	supported
H6c	IN \rightarrow SA \rightarrow LO	0.179***	0.111	0.265	<0.001	supported

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

H5a (PR \rightarrow TR \rightarrow LO): Consumer trust plays an indirect mediating role between professionalism and consumer loyalty ($\beta = 0.105$, $p < 0.001$). Therefore, H5a is supported.

H5b (AT→TR→LO): Consumer trust plays an indirect mediating role between attractiveness and consumer loyalty ($\beta=0.102$, $p<0.001$). Therefore, H5b is supported.

H5c (IN→TR→LO): Consumer trust plays an indirect mediating role between interactivity and consumer loyalty ($\beta=0.102$, $p<0.001$). Therefore, H5c is supported.

H6a (PR→SA→LO): Consumer satisfaction plays an indirect mediating role between professionalism and consumer loyalty ($\beta=0.143$, $p<0.001$). Therefore, H6a is supported.

H6b (AT→SA→LO): Consumer satisfaction plays an indirect mediating role between attractiveness and consumer loyalty ($\beta=0.157$, $p<0.001$). Therefore, H6b is supported.

H6c (IN→SA→LO): Consumer satisfaction plays an indirect mediating role between interactivity and consumer loyalty ($\beta=0.179$, $p<0.001$). Therefore, H6c is supported.

Discussion, Conclusion and Recommendation

Discussion

The discussion will be clarified to match the goals of this study.

Objective 1: To investigate the direct influence of streamer characteristics (professionalism, attractiveness, and interactivity) on consumer trust (H1a-c).

Research findings indicate that streamer characteristics, specifically professionalism, attractiveness, and interactivity, have a positive impact on consumer trust. Firstly, the positive influence of streamer professionalism on consumer trust aligns with the research results of Ma et al. (2022). This can be explained by the fact that when consumers lack in-depth or comprehensive knowledge about a product, a professional streamer can enhance their understanding of the product's performance, thereby gaining their trust. Secondly, the positive influence of streamer attractiveness on consumer trust is consistent with the findings of Grassauer & Auinger (2024) and Law et al. (2023). This suggests that in live streaming, physically attractive streamers exhibit more persuasive effects, making it easier to gain consumer trust (Yeh et al., 2020). Lastly, the positive influence of streamer interactivity on consumer trust aligns with the research results of Liu & Oda (2021). Timely interactions also contribute to a high level of trust in the streamer among consumer (Wongkitrungrueng, A., & Assarut, N. 2020). Streamers' timely answers to consumer's questions improved the consumer service experience (Zhang et al., 2022) and shortened the psychological distance between both parties (Yoon et al., 2008). Timely interactions also allow consumer to understand the product better and generate trust in the streamer (Lee, 2005).

Objective 2: To investigate the direct influence of streamer characteristics (professionalism, attractiveness, and interactivity) on consumer satisfaction. (H2a-c)

Research findings indicate that streamer characteristics, specifically professionalism, attractiveness, and interactivity, have a positive impact on consumer satisfaction. When the live streamer provides high-quality interactive information (such as fast, accurate, and real response to the audience's inquiries about the product) during live stream, consumer can acquire the information they need, the live stream atmosphere can be activated, and a

shopping atmosphere of trust can be created, which effectively improves users' online trust and satisfaction (Meng & Lin, 2023). Streamers should dress formally and wear appropriate makeup in an effort to portray a favorable exterior image, thereby satisfying consumer expectations (Póvoa et al., 2020). Streamers' interactivity is a psychological state that users experience in online interaction. It is the atmosphere users create through the network to perceive mutual influence and interaction (Floh, 2013). As a unique feature of live-stream e-commerce, interactivity can bring an immersive and engaging shopping experience, resulting in more intimate relationships (Wohn & Guo, 2018) (Joo & Yang, 2023).

Objective 3: To investigate the direct influence of consumer trust and consumer satisfaction on consumer loyalty. (H3-H4).

Research findings indicate that both consumer trust and consumer satisfaction have a positive impact on consumer loyalty. Firstly, the positive influence of consumer trust and consumer satisfaction on consumer loyalty is consistent with the research results of Juwaini et al. (2022) and Kurniadi & Rana (2023). Additionally, a comparison of the data reveals that the impact of consumer satisfaction on consumer loyalty is greater than that of consumer trust. Trust is a relationship that is built over time, while satisfaction is an immediate response. When consumers feel satisfied, they instantly develop goodwill and loyalty. Although trust is crucial, its establishment and effect require a longer period. Therefore, in the short term, satisfaction has a more significant impact on loyalty.

Objective 4: To investigate the mediating effect of consumer trust and consumer satisfaction between streamer characteristics and consumer loyalty (H5a-c, H6a-c).

Research findings indicate that consumer trust and consumer satisfaction mediate the relationship between streamer characteristics and consumer loyalty. This result aligns with the findings of previous studies Meng & Lin (2023). The mediating role of consumer trust and consumer satisfaction between streamer characteristics and consumer loyalty reveals how streamer characteristics enhance consumer loyalty by increasing consumer trust and satisfaction. This mediation effect highlights the importance of consumers' psychological and emotional experiences in the process of developing loyalty.

Theoretical Contributions

This study, by constructing a structural equation model, delves into the impact of streamer characteristics (including professionalism, attractiveness, and interactivity) on consumer trust, satisfaction, and loyalty. Previous research has largely focused on how streamer characteristics influence consumer purchase intentions. This study expands this field by revealing that streamer characteristics not only affect consumers' immediate purchasing decisions but also play a significant role in long-term consumer trust, satisfaction, and loyalty. By thoroughly analyzing the relationship between streamer characteristics and consumer behavior, this research provides a theoretical foundation for the selection and training of streamers in the e-commerce live streaming industry, enriching the literature in this domain.

An important theoretical contribution of this study is the elucidation of the mediating

role of consumer trust and satisfaction between streamer characteristics and consumer loyalty. Through empirical analysis, the study finds that streamers' professionalism, attractiveness, and interactivity not only directly influence consumer trust and satisfaction but also enhance consumer loyalty through these mediators. This finding supplements existing research by illustrating the application context of consumer trust and satisfaction as mediating variables, demonstrating their critical roles in the e-commerce live streaming industry. The results provide empirical support for the theoretical model, extending the application scope of consumer behavior research and offering valuable references for other similar studies.

Practical Implications

For streamers, it is essential to thoroughly understand consumers' purchasing needs and psychological characteristics to cultivate and enhance their relevant traits. Instead of blindly following and imitating top streamers by focusing on appearance and traffic, streamers should highlight unique qualities that address consumer pain points, which can lead to better live streaming results than homogenized content. For enterprises aiming to use live streaming as a marketing tool, this study provides new insights for selecting streamers. Instead of solely considering fame and cost, businesses can choose streamers with the appropriate characteristics to achieve their desired live streaming outcomes. For the e-commerce live streaming industry, beyond setting standards to regulate streamer behavior and manage live streams, the industry can promote sustainable development through training programs. These programs can help streamers and enterprises understand effective live streaming methods and how to showcase streamer characteristics to enhance visibility, attract traffic, and achieve marketing success in a healthier and more efficient manner.

Limitation and Future Research

Although the research has obtained some meaningful conclusions and enlightenment, there are still some limitations that need further research.

This study, while robust in its methodology and findings, has certain limitations that warrant consideration. Firstly, the data used in this research were collected from Chinese consumers with live streaming shopping experience during a specific period. Although the sample size is sufficient, the data may have regional and cultural limitations, making it difficult to fully represent consumer behavior in other regions or cultural contexts. Given the rapid development of the e-commerce live streaming industry, consumer behavior and preferences may evolve with advancements in time and technology. The data collection for this study occurred at a specific time, potentially limiting its ability to reflect future trends and changes.

Furthermore, while this study examined the mediating role of consumer trust and satisfaction between streamer characteristics and consumer loyalty, it did not delve deeply into the chained mediation effects. For instance, it remains unexplored whether consumer trust influences consumer loyalty through consumer satisfaction or vice versa. Neglecting to investigate these chained mediation effects may lead to a partial understanding of the mediation mechanisms.

To address these limitations, future research could expand the scope of sample selection to enhance the generalizability of the findings. Conducting longitudinal studies to continuously track changes in consumer behavior would provide a better understanding of the dynamics within the e-commerce live streaming industry and the long-term trends in consumer preferences. Additionally, future research should explore the chained mediation effects between consumer trust and satisfaction. Introducing other potential mediating variables, such as consumer engagement and perceived value, could also offer a more comprehensive understanding of how streamer characteristics influence consumer loyalty.

Conclusion

This study constructed a theoretical model involving streamer characteristics (professionalism, attractiveness, and interactivity), consumer trust, consumer satisfaction, and consumer loyalty. Through empirical research, it was found that streamer characteristics have a direct positive impact on consumer trust and satisfaction, and can also positively influence consumer loyalty through the mediating roles of consumer trust and satisfaction. Among these factors, the impacts of professionalism, attractiveness, and interactivity on consumer trust showed no significant differences. However, interactivity had a greater effect on consumer satisfaction compared to professionalism and attractiveness. Additionally, consumer satisfaction had a more substantial impact on consumer loyalty than consumer trust.

Ethics declaration: Authors declared that the participants were assured that their participation is voluntary and that they can withdraw from the study at any time. The data collected from the participants was kept confidential and anonymous, and the data was only be used for research purposes.

Conflicts of Interest: The authors declare no conflict of interest.

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