

Study on the Impact of Live E-commerce Pop-up Information Quality on Consumers' Purchase Intention: A Mediating Role based on Psychological Mechanisms

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Abstract

With the rapid development of mobile Internet, e-commerce live broadcasting, as an emerging business model, has become an important means to promote economic circulation and market vitality by virtue of its immersive product display and interactive information service. As an important interactive communication method in e-commerce live broadcasting, the information quality of the pop-up screen has an important impact on consumers' purchase intention. However, there are relatively few current studies on the impact of the information quality of live e-commerce pop-up screen on consumer purchase intention. Based on the stimulus-organism-response (SOR) theory, this study constructed a model of the influence of pop-up information quality on consumers' purchase intention, and explored the mediating role of trust and emotional resonance. Through a questionnaire survey, 502 valid samples were collected and empirically analyzed using structural equation modelling (SEM). The results of the study show that the quality of e-commerce live pop-up information has a significant impact on consumer purchase intention, with accuracy being the key factor. Trust and emotional resonance play an important mediating role between the quality of pop-up information and consumers' purchase intention, and the accuracy of pop-up information significantly enhances consumers' purchase intention by increasing trust and emotional resonance. This study not only expands the research on the impact of pop-up information quality on consumer behavior in the field of new media interaction, but also provides theoretical basis and practical guidance for e-commerce platforms to optimize pop-up management, anchors to improve their interaction strategies, and consumers to make rational decisions. Future research can further explore the differences in the quality of pop-up information in different live broadcasting types, as well as combining more technical means to deeply mine pop-up data to reveal more complex consumer behavior mechanisms.

Keywords

E-commerce Platform; Live Broadcasting Pop-up Screen; S-O-R Theory; Psychological Mechanism; Consumer Purchase Intention.

1. Introduction

With the rapid development of the mobile Internet, people are no longer satisfied with simple text or image-based content sharing, and short videos and real-time webcast-style content sharing modes are swarming. E-commerce live streaming is an emerging business model that uses live streaming technology on a web platform to provide immersive product displays and information services, and to help provide guidance to shoppers. The Statistical Report on Internet Development in China was officially released in January 2025 by the authoritative China Internet Network Information Centre (CNNIC). The report exhaustively reveals that by

December 2024, the number of Internet users in China had surged to 1.108 billion, with Internet penetration as high as 78.6 per cent, an achievement that highlights China's massive scale and exuberant vitality as the world's leading digital society. Further in-depth analysis shows that as of December 2024, China's webcasting user base has expanded significantly to 974 million, occupying 87.9% of the total number of Internet users. In this field, e-commerce live streaming is particularly notable, with its user base reaching 833 million, accounting for 75.2% of the overall Internet users. E-commerce live broadcasting is gradually recognized by more and more consumers for its rich content and its ability to meet the social needs of users, and has become an effective means to promote the internal cycle of the economy and stimulate the vitality of the market. Therefore, the factors affecting consumers' purchase intention in e-commerce live streaming have also received more and more attention from scholars.

Unlike traditional e-commerce, consumers watching live e-commerce are often not satisfied with just watching the live broadcast, but rather the pursuit of interaction and sociality, and pop-ups enhance the consumer experience of watching live broadcasts with their unique interactive communication. Consumers need to assist themselves in making consumption decisions based on a large amount of relevant information during the online purchasing process, and the quality of this information affects consumers' attitudes and behaviors. In the existing e-commerce live banding process, the pop-up screen is the main way of interaction and communication between the anchor and the consumer, the consumer and the consumer, live users can send pop-up screens to ask questions to the anchor, express their views, give gifts, etc., but also to communicate with other users in the live room, so the pop-up screen is often used to express the user's views and emotions of the user at this time to watch the live video [1]. The pop-up screen can not only express the user's inner resonance, and the pop-up screen often contains the personal emotions of the users in the live room, conveying the audience's own emotional characteristics in the live room, which can provide a certain reference to the decision-making behavior of other users [2], the users in the live room may influence the purchase behavior of other users by sending pop-up screens. Based on this, this paper starts from the perspective of pop-up features in live e-commerce broadcasts to explore their influence on consumers' purchase intention. Because there is no guarantee that sellers do not have fraudulent or opportunistic tendencies, there is a high degree of uncertainty in social commerce such as e-commerce live streaming, and trust is the most important factor in social commerce to establish a good relationship among all participants. Therefore, it is important to investigate the role played by consumers' trust and emotional empathy in this influence mechanism.

Based on this, this study takes SOR theory as a framework to investigate the influence mechanism of e-commerce live pop-up information quality on consumers' purchase intention through the mediating role of trust and emotional resonance. At the theoretical level, by constructing the evaluation dimensions and psychological mechanism model of pop-up information quality, the research boundary in the field of new media interaction is expanded; at the practical level, the research results can provide direct guidance for platforms to design intelligent filtering algorithms for pop-ups and anchors to formulate real-time interaction strategies, which will help the standardization and sustainable development of the live broadcasting ecosystem.

2. Literature Review and Theoretical Foundation

2.1. Theoretical Foundation

2.1.1. Stimulus-Organism-Response Theory (SOR Theory)

According to the S-O-R theory, S stands for the material and social stimuli in the external environment; O refers to the the internal state of the individual or the organism's response to

S; R is the behavioral response to O, such as affective motivation, attitude and reasoning [3]. The model has been successfully applied in e-commerce research to study user behaviors such as website stickiness [4] and customer loyalty [5], as well as to study contexts such as online brand communities [6] and traditional live streaming platforms [7].

The adoption of the S-O-R framework as the theoretical foundation of this study has significant advantages. On the one hand, the model has been successfully applied to the study of online consumer behavior for exploring how social interactions influence customers' non-transactional or adoption behaviors [8], which provides a solid theoretical foundation for this study. On the other hand, the live streaming business environment differs significantly from traditional social commerce (s-commerce), mainly in that it is geared towards real-time social interactions between broadcasters and their customers as well as between customers. The S-O-R framework is effective in capturing these unique elements and constructing a dynamic model to reflect the impact of social interactions on customer engagement behavior. In addition, the framework can be used to examine customers' motivations for building harmonious and close community relationships.

2.1.2. Psychological Mechanisms (Trust, Emotional Empathy)

Psychological Mechanism (Psychological Mechanism) refers to the internal system or process by which an individual responds accordingly through a series of complex mental activities (e.g., perception, memory, thinking, and emotional response) when faced with external stimuli or internal demands. These mechanisms and processes are usually unconscious, but they play a crucial role in shaping our behavioral patterns and ways of thinking. In consumer behavior research, psychological mechanisms refer to the process by which external stimuli (e.g., information, environment, interaction) trigger changes in the internal psychological states of the small law which further drive their behavioral decisions. In the e-commerce live broadcasting scenario, psychological mechanism is a key mediating variable linking the quality of pop-up information (external stimuli) and consumer purchase intention (behavioral outcome).

2.2. Literature Review

Currently, there are fewer foreign studies on the quality of pop-up information in e-commerce live broadcasting, and most of them are about the impact of the quality of pop-up information in e-commerce live broadcasting on the number of pop-ups, length, emotional tendency, interactivity and other characteristics on consumers' purchase intention and sales efficiency. In the context of e-commerce live purchasing, the usual process is for the anchor to send up a real-time video interaction to comprehensively display the product features and stimulate the user's desire to purchase from multiple dimensions. The live shopping mode significantly enhances the authenticity, intuitiveness and interactivity of online shopping, and the instant interactive function of pop-ups further strengthens this authentic, intuitive and interactive shopping experience [9]. M. Zhang et al. found that the impact of the overall attributes of e-commerce live streaming on consumers' purchasing found that e-commerce live streaming improves consumers' online purchasing desire by reducing psychological uncertainty and perceptual uncertainty [10]. K. Kang et al. and M. Zhang et al. investigated the factor of anchor interactivity and found that the moderating role of anchor popularity in the interaction between live broadcasts and the strength of consumers' perceived connection, which in turn affects consumers' willingness to buy, was found in X. Xu et al [11][12]. In X. Xu et al.'s study, they explored how the creation of scene atmosphere, the attractiveness of the live broadcast, the nature of the social interaction and the quality of the information, and other dimensions, which all work together to influence consumers' purchase desire in e-commerce live broadcasts, from the point of view of the characteristics of the live broadcasting scene. The moderating effect of anchor popularity between live streaming interactions and the strength of consumers'

perceived connection is revealed, which in turn has a significant impact on consumers' purchase intention [13].

In addition, the questioner's information-demanding pop-ups may also inspire other users to follow the crowd's purchasing behavior. Chun-Der Chen, in his study of live e-commerce, further analyzed the path of consumer trust formation with the help of the ELM model, and explored how this trust mechanism is closely related to consumers' purchase intention [14].

The results of related studies have shown that the accuracy of the pop-up content can enhance the consumers' trust in the products, thus increasing the purchase intention. For example, the positive features (e.g., entertainment and usefulness) of pop-ups in e-commerce live broadcasts have a significant positive effect on consumer trust, which in turn promotes purchase intention [15]; emotional pop-ups can trigger consumers' emotional resonance, which in turn stimulates purchase motivation. For example, emotionally matched ad insertion mechanism can enhance consumers' purchase intention through emotional resonance [16]. In addition, emotional pop-ups can also indirectly affect purchase intention by enhancing users' immersion and psychological ownership [17]; the interactivity of pop-ups can enhance communication between consumers and anchors or other viewers, thus enhancing users' engagement and satisfaction. For example, the quantity and quality of pop-up interactions have a significant positive effect on consumer purchase decisions [18]. Interactivity can also indirectly affect purchase intention through the mediating effects of perceived pleasure and trust [19]; the richness of pop-up content can provide more sources of information and help consumers make more informed purchase decisions. For example, the diversity of pop-ups can satisfy consumers' information needs and enhance purchase intention by enhancing social presence [20].

In addition, the influence of pop-up screen information quality on consumers' purchase intention not only plays a direct role in the purchase decision, but also plays an indirect role through a series of psychological mechanisms, among which trust and emotional resonance are important mediating variables. Trust plays an important role as a mediating variable between pop-up information quality and purchase intention. For example, positive features of pop-ups (e.g., entertainment and usefulness) enhance purchase intention by increasing consumer trust [15]. In addition, trust can indirectly influence purchase intention through the mediating effects of perceived interactivity and usefulness [21]; emotional resonance is another important mediating variable. Emotional pop-ups are able to enhance consumers' interest in goods and purchase motivation by triggering their emotional resonance. For example, emotionally matched advertisement insertion mechanism can enhance consumers' purchase intention through emotional resonance [16].

The above research literature provides solid theoretical and empirical support for how the quality of pop-up information in e-commerce live broadcasts based on psychological mechanisms affects consumers' purchase intention. After systematic sorting, we can clearly summarize the research results on the relationship between the quality of pop-up information in e-commerce live broadcasting rooms and consumers' purchase intention. In the field of international research, although there are relatively few studies that directly address this topic, scholars have already focused on the overall characteristics of e-commerce live broadcasting, such as the creation of the live broadcasting environment, the interaction mechanism between anchors and viewers, and the communication style of anchors, etc., and explored in depth the impact of these factors on consumer purchase intention.

Consumer purchasing behavior is influenced by multi-level factors, which contain individual cognitive characteristics (e.g., depth of information processing) and also rely on environmental cues (e.g., pop-up interactive atmosphere). This complexity determines that it is difficult for a single variable to adequately explain behavioral motivation, and the causal chain of 'information quality → psychological response → behavioral decision-making' needs to be

revealed through a mediating mechanism. In this paper, trust and emotional resonance are chosen as dual mediating variables precisely because they correspond to the dual paths of rational cognition and emotional decision-making, which can systematically explain how pop-up information is transformed into purchase intention through psychological mechanisms. Previous studies have shown that the quality of pop-up information indirectly affects purchase intention through trust (rational path) and emotional resonance (perceptual path), but most of them focus on a single mediator or general dimension. This paper innovatively integrates a dual-path mechanism: on the one hand, pop-up accuracy builds trust by reducing perceived risk; on the other hand, affective interaction stimulates immersive experience through empathy. The two echo consumers' core demands for live streaming 'utility' and 'entertainment' respectively. This paper aims to more comprehensively analyze the impact of the four dimensions of the quality of pop-up information from live e-commerce broadcasts on consumers' purchase intention, and to explore the impact of psychological mechanisms on consumers' purchase intention, with a view to providing more in-depth insights and strategic recommendations.

3. Model Construction and Questionnaire Design

Based on the literature review, this paper takes SOR theory as the basic theoretical support, combines the development status quo of e-commerce live broadcasting, constructs a model of the factors influencing the psychological mechanism acting on the quality of pop-up information on the consumer's purchase intention, puts forward the theoretical hypothesized relationship between each relevant variable, and designs and distributes a questionnaire.

In order to empirically analyze the hypothesis theory, this paper establishes Structural Equation Modeling (SEM) based on the above theoretical foundation, and supplements it with Confirmatory Factor Analysis (CFA) to quantify the effects of "pop-up information accuracy", "pop-up information quality", "pop-up information quality", "pop-up information quality", "pop-up information quality", "pop-up information quality" and "pop-up information quality". Information Accuracy", "Pop-up Information Emotionality", "Pop-up Information Interactivity", "Pop-up Information Richness" and other potential variables, and then analyze the influence of the model framework is shown in Figure 1.

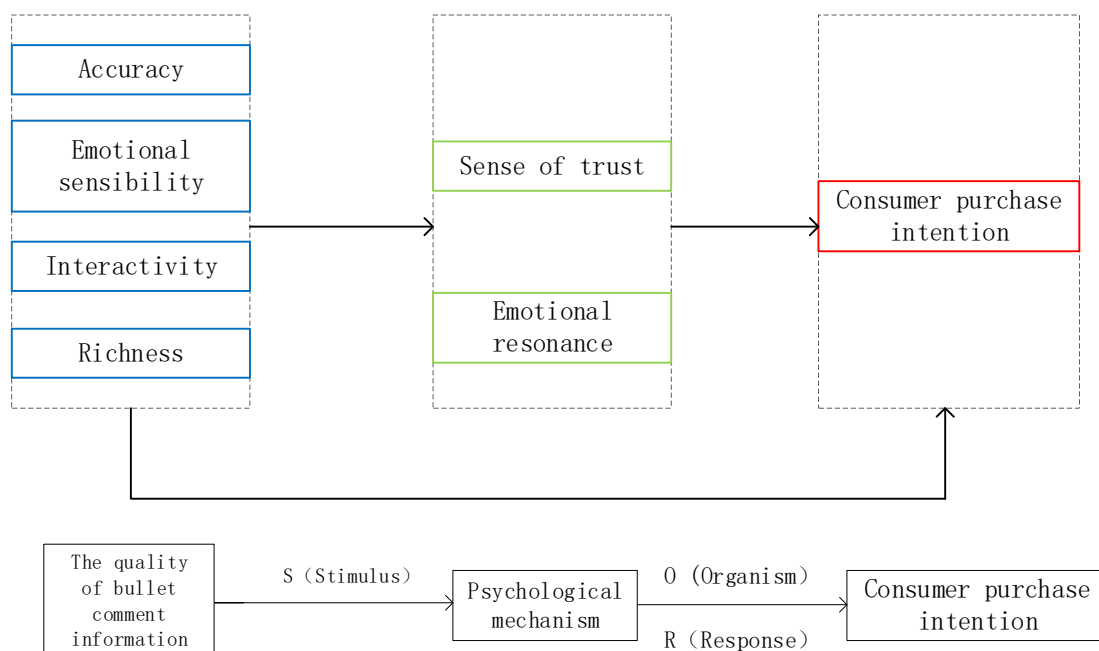


Figure 1. Model framework

3.1. Interpretation of Model Variables

The model of the influence of pop-up information quality on consumers' purchase intention constructed in this study covers four independent variables (accuracy, emotionality, interactivity and richness of pop-up information), two mediating variables (trust and emotional resonance) and one dependent variable (consumers' purchase intention).

3.1.1. Accuracy of Pop-up Information

The accuracy of pop-up information mainly refers to whether the content of pop-ups is true and reliable, and can accurately reflect users' understanding and evaluation of video content. Sentiment data in the pop-up screen can be extracted through sentiment analysis technology and combined with semantic analysis technology to improve the accuracy of the pop-up screen text.

3.1.2. Emotionality of Pop-up Messages

The emotionality of the pop-up screen refers to whether the content of the pop-up screen can fully express the emotional state of the user. Research shows that pop-up texts usually contain rich emotional information, such as joy, anger, sadness and other emotional expressions [22][23]. By constructing a sentiment lexicon in the pop-up domain and utilizing a sentiment analysis model, the emotional features in pop-ups can be captured more accurately. In addition, sentiment analysis of pop-ups can be applied to mental health detection and video recommendation systems [24].

3.1.3. Interactivity of Pop-up Messages

The interactivity of pop-ups is one of its core features, referring to the fact that pop-ups, as a form of instantaneous comments, can promote interactive communication among viewers [25][26]. The interactivity of pop-up videos is not only reflected in the real-time communication between viewers and creators, but also in the discussion and feedback between viewers through pop-ups [26][27].

3.1.4. Richness of Pop-up Information

The richness of the pop-up screen is reflected in the diversity of its content and the flexibility of its expression. The pop-up text usually contains a large number of network buzzwords, emoticons and informal terms, which makes the pop-up content more vivid and interesting [28]. In addition, pop-up texts are also characterized by a high degree of linguistic abbreviation and colloquialism, which enables them to spread quickly and attract more viewers [28][29].

3.1.5. Sense of Trust

Sense of trust refers to an individual or group's psychological assessment of the credibility, reliability, and safety of an object (e.g., a person, message, platform, or brand). In a pop-up or social media environment, the sense of trust usually involves the user's perception of the authenticity of the source of information, the credibility of the publisher, and the fairness of the platform mechanism.

3.1.6. Sensual Empathy

Emotional resonance refers to an individual's similar or strong emotional response when receiving information or observing another person's expression, forming a psychological empathic connection. In pop-up culture, emotional resonance is reflected in viewers triggering collective emotions (e.g., touching, anger, joy) due to a particular pop-up, thus enhancing interaction and sense of belonging.

3.1.7. Consumer Purchase Intention

The likelihood or inclination of a consumer to plan or tend to purchase a product or service in a certain period of time in the future [30].

3.2. Research Hypothesis

In the framework of planning theory, "subjective norms" relate to the expectations of significant others around an individual about his or her behavior and the individual's adaptation to these expectations. This paper specifies the concept of "subjective norms" through four dimensions: accuracy of pop-up messages, emotionality of pop-up messages, interactivity of pop-up messages and richness of pop-up messages. Specifically, when pop-ups contain verifiable product parameters (e.g., ingredients, origin) and price comparisons, users' trust in the anchor's professionalism and the platform's reliability increases significantly. Accuracy reduces consumer-perceived risk by lowering information asymmetry; emoticons and emotional language (e.g., "The anchor has put his heart into it!"), which are used frequently in the pop-up screen, activate the consumer-perceived risk through mirror neuron mechanisms. activate users' emotional imitation through the mirror neuron mechanism, producing an emotional synchronization effect with the anchor or other viewers; the timeliness and depth of two-way communication between users and the anchor and other viewers through real-time comments (pop-ups) in the live broadcasting scenario are conducive to promoting consumers' better understanding of the product and their willingness to buy; the multimodality and information density of pop-ups in the live broadcasting scenario have an impact on consumers' willingness to buy. The multimodality and information density of pop-up content in the live broadcasting scene will have an impact on consumers' purchase intention.

Based on the relevant literature, theoretical framework and variable settings, this paper constructs a research model of the impact of pop-up information quality on consumers' purchase intention, and puts forward 14 hypotheses covering seven aspects, as shown in Figure 2.

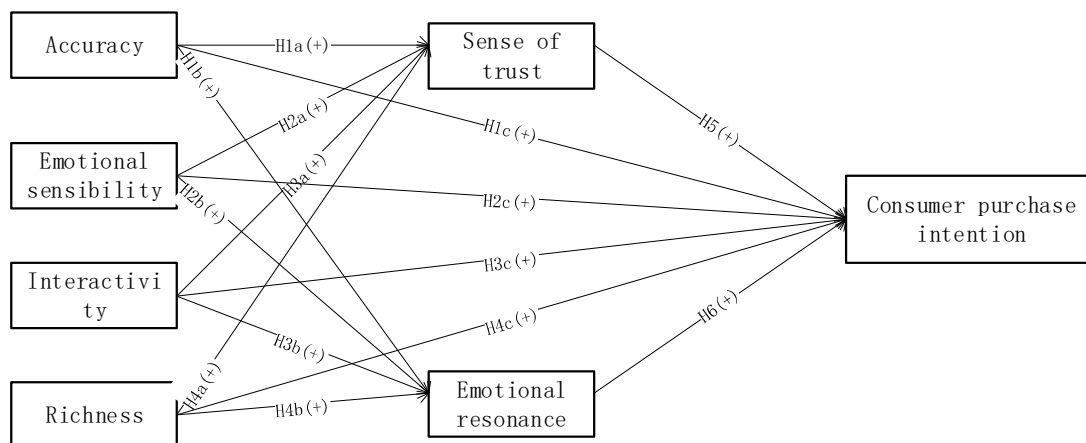


Figure 2. Research model of the effect of pop-up information quality on consumers' purchase intention

Note: H stands for hypotheses, numbers stand for ordinal numbers, and a, b, and c indicate the hypothetical paths of the same independent variable on two mediating variables (trust and emotional resonance) and one dependent variable. "+" indicates that the independent variable has a positive effect on the mediator variable and the dependent variable, and the mediator variable has a positive effect on the dependent variable. The following figure is the same.

3.3. Questionnaire Design

Based on the study of the impact of pop-up information quality on consumers' willingness to buy: the mediating role based on psychological mechanisms, the authors of this paper drew on the literature, other relevant information, involving two types of questionnaires: personal basic information questionnaire and the questionnaire of influencing factors.

In the influencing factors questionnaire, 7 factors are included in the model of this study, so 21 topics are designed, all of which are investigated by means of Likert 5-level scale, as shown in Table 1.

Table 1. Influencing factors questionnaire

Variable	No.	Question item
Accuracy of pop-up information	BIA1	Functions/effects of products mentioned in live pop-ups are consistent with the actual situation.
	BIA2	The description of the shortcomings of the product in the pop-up screen is true.
	BIA3	The experience shared by other viewers (e.g., for sensitive skin) is in line with my expectations.
Emotionality of pop-up messages	BIE1	The pop-up screen is full of strong emotional expressions (e.g. "It's a great deal! Go for it!")
	BIE2	The content of the pop-up makes me feel the emotions of other viewers.
	BIE3	Occasional negative emotions in the pop-ups (e.g., "The quality is too bad, don't buy it!")
Interactivity of pop-up messages	BII1	Anchor responds to questions in the pop-ups in a timely manner
	BII2	Viewers communicate with each other about their experience through pop-ups
	BII3	Collective collaborative behaviors (e.g., "Everyone, quickly click to 10,000 to unlock the benefits") occur in the pop-up screen.
Richness of pop-up messages	BIR1	Pop-ups cover a wide range of information such as product price, quality, service, etc.
	BIR2	In-depth evaluation of the product (e.g. comparison of advantages and disadvantages) is often found in the pop-up screen.
	BIR3	The content of pop-ups is too cluttered, making it difficult to find useful information quickly (e.g., "promotional information and chit-chat at the same time").
Trust	ST1	I think the product information in the pop-ups is reliable.
	ST2	Anchors screen for fake pop-ups to ensure the authenticity of the content.
	ST3	The anchor will prioritize the interests of viewers rather than simply promoting goods (e.g. "reminding rational consumption")
Emotional resonance	ER1	Emotional expressions in the pop-ups ("e.g., I was moved to tears") make me feel the same way.
	ER2	I have an emotional connection with other viewers in the pop-up (e.g., cheering for the countdown to the promotion).
	ER3	The story or idea shared by the anchor (e.g., "support national products") resonated with me.
Consumer Purchase Intention	CPI1	If there is a special offer in the live broadcast, I will click the buy button directly.
	CPI2	I will buy the product immediately because of the recommendation of the pop-up screen
	CPI3	I will make a purchase decision more quickly when I see many people swiping "already ordered" in the pop-up screen.

4. Evidence Analysis

4.1. Descriptive Statistical Analysis

The above questionnaire was distributed through the Internet on 30 April 2025, and a total of 502 valid samples were collected with complete and valid information, and the length of

completion was normal. The survey respondents are the users who participated in e-commerce live streaming in the past 6 months.

In our sample, 86.06% of the respondents were under 35 years old, of which 55.98% were male and 44.02% were female. Among them, 38.05% have a monthly income between 6,000 and 10,000 RMB. The live streaming platform they often use is professional head anchors. There are 59.16% of them watch live e-commerce broadcasts between 3-5 times per week on average, as shown in Table 2.

Table 2. Descriptive Statistical Analysis

Measure	Items	Frequency	Percentage
Sex	Male	281	55.98 per cent
	Female	221	44.02 per cent
Age	18 and below	36	7.17 per cent
	19-25 years old	95	18.92 per cent
	26-30 years old	195	38.84 per cent
	31-35 years	106	21.12 per cent
	36 and above	70	13.94 per cent
Academic qualifications	High school/vocational high school	58	11.55 per cent
	College	165	32.87 per cent
	Undergraduate	236	47.01 per cent
	Master and above	43	8.57 per cent
Occupation	Full-time students	96	19.12 per cent
	Commuters	247	49.2 per cent
	Other Occupation	146	29.08 per cent
	Other	13	2.59 per cent
Income	Below \$3000	99	19.72 per cent
	3000-6000 yuan	123	24.5 per cent
	6000-10000 yuan	191	38.05 per cent
	Above 10000 RMB	89	17.73 per cent
Live broadcast type (multiple choice)	Professional head anchor (e.g. Li Jiaqi)	286	56.97 per cent
	Star anchor (e.g. Liu Tao)	250	49.8%
	Enterprise official live broadcasting room (e.g. Xiaomi flagship shop)	167	33.27 per cent
	Platform niche anchors	222	44.22 per cent
	Other	58	11.55 per cent
Number of times watching live streaming	1-2 times	128	25.5 per cent
	3-5 times	297	59.16 per cent
	More than 5 times	77	15.34 per cent

4.2. Results of Structural Equation Modelling Test

4.2.1. Reliability Analysis

Reliability Analysis (Reliability Analysis) is to ensure the effectiveness of model fit evaluation and hypothesis testing, this paper uses SPSS22.0 to investigate the results of the reliability test, and the Cronbach reliability coefficient is used to check the consistency of the questionnaire

research variables in the measurement of each item. In order to have good reliability, the Cronbach's coefficient must be greater than 0.7, and the general practice of improving reliability is to reduce the variables, mainly based on two conditions: (1) if the correlation of the item with the total score of other items after deleting the item is less than 0.5, the item is deleted; (2) if the Cronbach's coefficient increases after deleting the item, the item is deleted; and (3) if the Cronbach's coefficient increases after deleting the item, the Cronbach's coefficient increases, the Cronbach's coefficient increases after deleting the item, then the item is deleted. In this study, the above two points were used as the basis for purifying the items.

After summarizing the results of the questionnaire, SPSS22.0 was used to analyze the reliability test, and the Cronbach coefficients of the variables pop-up information accuracy, pop-up information emotionality, pop-up information interactivity, pop-up information richness, trust, and emotional resonance of the present study were 0.801, 0.833, 0.839, 0.849, 0.845, and 0.833 respectively, which were greater than 0.8, proving that the reliability and internal reliability of the present questionnaire are greater than 0.5, and the internal reliability of the present study is greater than 0.5. It proves that the reliability and internal consistency of this questionnaire are good, CITC are greater than 0.5, which indicates that the measurement questions items meet the requirements of the study. The fact that the deletion of the question items does not cause an increase in Cronbach's coefficient proves that the scales have good reliability. The details are shown in Table 3.

Table 3. Results of Reliability Analysis

Variables	Cronbach's alpha value	Number of items
Accuracy of pop-up information	0.801	3
Emotionality of pop-up messages	0.833	3
Interactivity of pop-up messages	0.839	3
Richness of pop-up messages	0.849	3
Sense of trust	0.845	3
Emotional empathy	0.833	3
Consumer willingness to buy	0.825	3
Overall Scale	0.911	21

4.2.2. Validity Tests

Questionnaires are generally tested by applying content and structural validity. Among them, content validity refers to the degree of suitability and logical conformity of the items and the independent variables measured, and structural validity refers to the ability of the items to consider the independent variables measured. In this study, exploratory factor analysis (EFA) was conducted to verify the structural validity of the scale based on the information collected. Generally, the Exploratory Factor Analysis requires the feasibility analysis test based on factor analysis method, which must satisfy two conditions: first, $KMO > 0.7$; second, Bartlett's spherical detection is obvious ($Sig. < 0.05$). The feasibility analysis detection based on factor analysis method was carried out using SPSS 22.0, and KMO and Bartlett's spherical detection were carried out on the rating scale, and the results are shown in Table 1.

As shown in Table 4, $KMO = 0.896$, which is more than 0.7, and the value of sphericity detection is obvious ($Sig. < 0.05$), which indicates that the questionnaire data are eligible for factor analysis.

Table 4. KMO and Bartlett's spherical test

KMO and Bartlett's test		
KMO Number of Sampling Suitability Quantity.	Approximate chi-square	0.896
		5056.361
Bartlett's test of sphericity		
Degree of freedom		210
		.000

4.2.3. Correlation Analysis

Based on the validity and reliability analyses in the previous section, the structure of the dimensions and the corresponding question items were confirmed, and the mean value of the scores of the question items of each dimension was calculated as the scores of the corresponding dimension, and then correlation analyses were conducted. Correlation analysis is usually used to investigate the correlation between variables, and the correlation coefficient, r, is set at -1-1. The results of the correlation analysis are shown in Table 5, which shows that the correlation is significant at a confidence level of 0.01 (two-sided).

Table 5. Correlation Analysis

	Accuracy	Emotionality	Interactivity	Enrichment	Trust	Emotional resonance	Consumer Purchase Intention
Accuracy	1						
Emotionality	.435**	1					
Interactivity	.335**	.404**	1				
Richness	.387**	.390**	.407**	1			
Sense of trust	.427**	.411**	.414**	.409**	1		
Emotional resonance	.421**	.429**	.356**	.374**	.441**	1	
Consumer Willingness to Buy	.390**	.409**	.346**	.311**	.390**	.398**	1

** . The correlation is significant at the 0.01 level (two-tailed).

4.2.4. Structural Equation Model Path Structure

The research model constructed in this paper to study the impact of pop-up message quality on consumer purchase intention has four independent variables, two mediating variables and one dependent variable. All independent variables in the model have residual terms, and the mediating and dependent variables have variance terms.

After completing the reliability test, this paper uses AMOS 29.0 software as a testing tool to construct the structural equation model according to the theoretical framework and hypotheses needed, as shown in Figure 3.

4.2.5. Structural Equation Model Fit.

Analyzing the structural equation model, it can be obtained that the CMIN/DF of the model is 1.094, which is less than 3, GFI=0.967, AGFI=0.954, which are all greater than 0.8, and TLI, IFI, and CFI are all greater than 0.9, and although the RMSEA is 0.014, which is less than 0.08, most of the indexes are in line with the research standard, and thus it is considered that the model has a good fitness.

4.2.6. Path Coefficients of Structural Equation Modelling

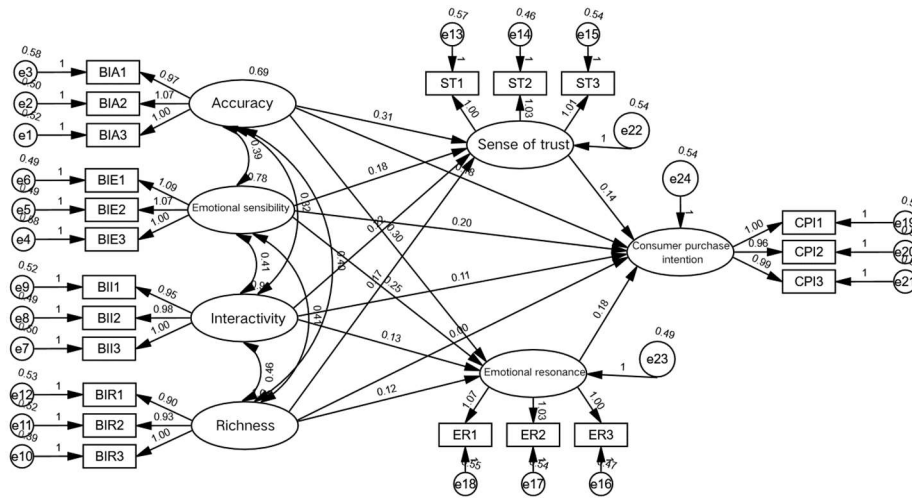


Figure 3. Structural equation model

Table 6. Path coefficients of structural equation model

Path relationship		Unstandardized path coefficients	Standardized path coefficients	S.E.	C.R.	P-value	Hypothesis number	Whether the hypothesis is valid or not	
Sense of trust	<---	Accuracy	0.310	0.268	0.072	4.329	***	H1a	Yes
Emotional resonance	<---	Accuracy	0.300	0.278	0.069	4.371	***	H1b	Yes
Sense of trust	<---	Emotional	0.176	0.161	0.067	2.636	0.008	H2a	Yes
Emotional resonance	<---	Emotional	0.248	0.243	0.065	3.83	***	H2b	Yes
Sense of trust	<---	Interactivity	0.224	0.222	0.058	3.86	***	H3a	Yes
Emotional resonance	<---	Interactivity	0.126	0.134	0.055	2.293	0.022	H3b	Yes
Trust	<---	Richness	0.172	0.179	0.055	3.119	0.002	H4a	Yes
Emotional resonance	<---	Richness	0.124	0.138	0.052	2.355	0.019	H4b	Yes
Consumers' willingness to buy	<---	Sense of trust	0.142	0.148	0.062	2.286	0.022	H5	Yes
Consumer Purchase Intention	<---	Emotional resonance	0.177	0.172	0.065	2.701	0.007	H6	Yes
Consumer Purchase Intention	<---	Accuracy	0.183	0.165	0.077	2.365	0.018	H1c	Yes
Consumers' willingness to buy	<---	Emotional	0.199	0.189	0.07	2.834	0.005	H2c	Yes
Consumer willingness to buy	<---	Interactivity	0.107	0.111	0.06	1.795	0.073	H3c	No
Consumers' willingness to buy	<---	Abundance	0.002	0.002	0.056	0.031	0.975	H4c	No

Note: *** represents significant at 0.1% level of significance

As shown in Table 6, the standard error (S.E.) coefficients are small, indicating that the parameter estimates have a high degree of accuracy. Judging by the level of 5% significance, H3c and H4c proposed in this paper are not valid, and the rest of the hypotheses are valid.

According to the empirical results, most of the theoretical hypotheses proposed in this paper have been verified. Next, this paper will deeply analyse the factor loadings of the mediator and dependent variables to further elucidate the variable relationships and interactions in the model.

Table 7 demonstrates the standardised path coefficients of each independent variable on trust. The results show that the emotionality of pop-up messages, the richness of pop-up messages, the interactivity of pop-up messages and the richness of pop-up messages all have a positive and significant effect on the sense of trust. Therefore, hypotheses H1a, H2a, H3a and H4a are valid. In terms of the absolute value of the factor loadings, pop-up information accuracy has the greatest effect on the sense of trust.

Table 7. Path coefficients of trust perception

	Accuracy of pop-up information	Emotionality of pop-up information	Interactivity of pop-up information	Richness of pop-up information
Sense of trust	0.268	0.161	0.222	0.179
Significant or not	Yes	Yes	Yes	Yes

Table 8 demonstrates the standardised coefficient paths of each independent variable on emotional resonance. The results show that emotionality of pop-up messages, richness of pop-up messages, interactivity of pop-up messages and richness of pop-up messages have positive and significant effects on emotional resonance. Therefore, hypotheses H1b, H2b, H3b and H4b are valid. In terms of the absolute value of factor loadings, pop-up information accuracy has the greatest effect on emotional resonance.

Table 8. Emotional resonance path coefficients

	Accuracy of pop-up information	Emotionality of pop-up information	Interactivity of pop-up information	Richness of pop-up information
Emotional resonance	0.278	0.243	0.134	0.138
Significant or not	Yes	Yes	Yes	Yes

Table 9. Path coefficients of consumer purchase intention

	Accuracy of pop-up information	Emotionality of pop-up information	Interactivity of pop-up information	Richness of pop-up information	Trust	Emotional resonance
Consumer Purchase Intention	0.165	0.189	0.111	0.002	0.148	0.172
Significant or not	Yes	Yes	No	No	Yes	No

Table 9 shows the standardised path coefficients of each independent and mediating variable on consumer purchase intention. The results show that pop-up message interactivity and pop-

up message richness do not have a significant effect on consumer purchase intention, while pop-up message emotionality, pop-up message richness, trust and emotional resonance have a positive and significant effect. Therefore, hypotheses H1c, H2c, H5 and H6 are valid and hypotheses H3c and H4c are not valid. In terms of the absolute value of the factor loadings, pop-up information emotionality has the greatest effect on emotional resonance.

In summary, the accuracy of pop-up information, the emotionality of pop-up information, the interactivity of pop-up information and the richness of pop-up information all positively and significantly affect the sense of trust and emotional resonance, and ultimately affect their purchase intention. Meanwhile, pop-up information accuracy and pop-up information emotionality can positively influence consumers' purchase intention.

4.3. Mediating Effect Test of Trust and Emotional Resonance

With the help of the software AMOS29.0, the mediation effect is tested using the Bootstrap mediation effect test method, which standardises each continuous variable before testing, and then randomly selects 5000 Bootstrap samples. If the Bootstrap 95% confidence interval does not pass through 0, it means that there is a mediation effect; conversely, means that there is no mediation effect.

Table 10. Mediation effect test of trust and emotional resonance

Parameter	Estimate	Lower	Upper	P
Accuracy of pop-up information → trust → consumer purchase intention	0.039	0.002	0.085	0.042
Accuracy of pop-up information → emotional resonance → consumer purchase intention	0.048	0.012	0.092	0.007
Emotionality of pop-up information → trust → consumers' willingness to buy	0.024	-0.001	0.059	0.059 0.061
Emotionality of pop-up information → emotional resonance → consumers' willingness to buy	0.042	0.009	0.086	0.008
Interactivity of pop-up information → trust → consumers' purchase intention	0.033	0.001	0.074	0.042
Interactivity of pop-up information → emotional resonance → consumer purchase intention	0.023	0	0.056	0.056
Richness of pop-up information → trust → consumer purchase intention	0.026	0	0.063	0.046
Richness of pop-up information → emotional resonance → consumer purchase intention	0.024	0	0.058	0.045

From the results in Table 10, it can be seen that the accuracy of pop-up information significantly and positively affects purchase intention through the dual mediation path of trust and emotional resonance, and the effect value is the largest (accuracy of pop-up information → trust → consumers' purchase intention: 0.039; accuracy of pop-up information → emotional resonance → consumers' purchase intention: 0.048), and the accuracy of pop-up information is the core factor to enhance consumers' purchase intention. The accuracy of pop-up information is the core factor to enhance consumers' willingness to buy, which can both enhance rational trust and trigger emotional resonance; the emotionality of pop-up information significantly affects the willingness to buy only through emotional resonance, with an effect value of 0.042, and not significant through the path of sense of trust (P=0.061), and the emotionality of emotional content needs to rely on emotional resonance instead of rational trust to drive consumer behaviour; the interactivity of pop-up information

is significant only through the path of sense of trust, with an effect value of 0.033, and for the path of emotional resonance is only marginally significant ($P = 0.056$), interactivity is more inclined to establish the user's sense of trust in the product or community, the auxiliary role of emotional resonance is weaker; pop-up information richness of the indirect effect on the sense of trust and emotional resonance is marginally significant, the P-value is close to 0.05 and the effect value is smaller, respectively, for 0.026 and 0.024, therefore richness has a some role, the effect is weaker than accuracy or emotionality.

Based on this, the sense of trust is more driven by the accuracy of pop-up information and the interactivity of pop-up information, which is suitable for rational consumption scenarios; the emotional resonance is more driven by the accuracy of pop-up information and the emotionality of pop-up information, which is suitable for emotional consumption scenarios. And pop-up information accuracy letter is the only feature that can strengthen trust and emotional resonance at the same time, which has universal advantages.

5. Conclusion and Suggestion

5.1. Research Conclusion

Based on the SOR theory, this study thoroughly explores the influence of the quality of e-commerce live pop-up information on consumers' purchase intention and the mediating role of its psychological mechanism by constructing a structural equation model, and draws the following main conclusions.

5.1.1. The Core Dimensions of Pop-up Information Quality and its Influence Intensity

The four dimensions of pop-up information quality (accuracy, emotionality, interactivity, and richness) all have a significant impact on consumer purchase intention, but there are differences in the strength of the impact. Among them, the accuracy of pop-up information is the core factor influencing consumers' purchase intention, and its positive influence on trust and emotional resonance is the most significant, which in turn has a significant impact on consumers' purchase intention through these two paths. The emotionality of pop-up information has a stronger effect on emotional resonance, and can significantly influence consumers' purchase intention through emotional resonance, but its influence through the path of trust is weaker. The interactivity of pop-up information mainly influences consumers' purchase intention through trust, and its auxiliary effect on emotional resonance is weaker. The indirect effect of pop-up information richness on both the sense of trust and emotional resonance is weak, but still has a certain role.

5.1.2. The Mediating Effect Path of Psychological Mechanisms

Sense of trust and emotional resonance play an important mediating role between pop-up information quality and consumer purchase intention. Specifically, pop-up information accuracy significantly and positively affects consumer purchase intention through the dual path of enhancing trust and triggering emotional resonance, and the effect value is the largest. The emotionality of pop-up information mainly affects consumers' purchase intention through emotional resonance, while the interactivity of pop-up information mainly affects consumers' purchase intention through trust. The indirect effect of pop-up information richness on both trust and emotional resonance is weaker, but still has a certain mediating effect.

5.2. Management Implications

5.2.1. Implications for Platforms

E-commerce platforms should attach great importance to the management and optimisation of the quality of pop-up information, and enhance the accuracy, emotionality, interactivity and richness of pop-up information through technological means and rule-making. For example,

natural language processing technology can be used to monitor and screen pop-up content in real time, filtering false, misleading or low-quality pop-up information to ensure the authenticity and reliability of pop-up information, which in turn enhances consumers' trust in the platform. At the same time, the platform can encourage anchors and consumers to post more pop-up content with emotional value and interactivity to create a positive and active live atmosphere, enhance consumer participation and emotional resonance, and thus promote the enhancement of consumer purchase intention. In addition, the platform can also provide consumers with more comprehensive and multi-dimensional product information according to the richness of the pop-up content, helping consumers make better purchase decisions.

5.2.2. Implications for Anchors

Anchors should pay attention to the improvement of the quality of pop-up information in the live broadcasting process, and enhance consumers' trust in commodities by introducing commodity information accurately and truthfully. At the same time, anchors can use emotional language and expression to establish emotional connections with consumers, triggering their emotional resonance and thus stimulating their buying motives. For example, when introducing the products, the anchor can share some personal experience, touching stories or values related to the products, so that consumers have emotional recognition and resonance. In addition, the anchor should actively interact with the audience and respond to the questions and feedback in the pop-up screen in a timely manner, so as to enhance the audience's sense of participation and interactivity, and to improve the consumer's satisfaction with the live broadcast and willingness to buy. The anchor can also create a positive interactive atmosphere by guiding the audience to send pop-ups, promote communication and cooperation among the audience, and further enhance the interactivity and attractiveness of the live broadcast.

5.2.3. Implications for Consumers

When watching live e-commerce broadcasts, consumers should treat pop-up information rationally and pay attention to the quality and credibility of pop-up information. For the commodity information in the pop-up screen, consumers should combine their own needs and judgement, conduct comprehensive analysis and assessment, and avoid blindly following the trend to buy. At the same time, consumers can actively participate in the pop-up screen interaction, express their own views and feelings, communicate and share with other consumers and anchors to obtain more information and reference opinions, so as to make more informed purchasing decisions. In addition, consumers can also pay attention to the emotional expression and interactive atmosphere in the pop-up screen, and choose those live broadcasting rooms that can trigger emotional resonance and create a positive atmosphere, so as to enhance their own shopping experience and satisfaction.

5.3. Research Limitations and Future Prospects

Although this study has achieved certain results in theory and practice, there are still some limitations. Firstly, the samples of this study mainly come from specific e-commerce platforms and user groups, which may have certain limitations and biases, and future research can expand the sample scope to cover more e-commerce platforms and user types to improve the universality and representativeness of the research results. Secondly, this study mainly focuses on the impact of the four dimensions of pop-up information quality on consumers' purchase intention, but there may be other dimensions or factors of pop-up information quality, such as the timeliness and innovativeness of pop-ups, etc. Future studies can further expand the dimensions of pop-up information quality and deeply explore the mechanism of its impact on consumer behaviour. In addition, this study mainly uses questionnaire survey and structural equation modelling for empirical analysis, and future research can combine experimental research, case study analysis and other methods to further verify the reliability and validity of the findings.

Future research can also further explore whether there are differences in the impact of the quality of pop-up information on consumers' purchase intention in different types of e-commerce live broadcasts (such as professional head anchor live broadcasts, celebrity anchor live broadcasts, and official corporate live broadcasting rooms, etc.), as well as the causes and mechanisms of these differences. Meanwhile, with the development of artificial intelligence, big data and other technologies, future research can use these technical means to conduct more in-depth mining and analysis of pop-up data, explore the more complex relationship between pop-up information quality and consumer behaviour, and provide more valuable guidance and suggestions for e-commerce live broadcast platforms, anchors and consumers.

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