

# Research on The Impact of Reviews on Consumer Perceived Value in Live Streaming

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## ABSTRACT

E-commerce live streaming is a new form of online shopping, showing an explosive growth trend in recent years. And live reviews are one of the important influencing factors of consumer behavior. Taking live-streaming reviews as the research object, this paper constructs a model of the impact of live-streaming reviews on consumer perceived value including the mediating variable of social presence. We also put forward some hypotheses, and then tested the model and hypotheses through empirical methods. The results show that review quantity and review valence have a positive impact on consumers' perceived utilitarian value, perceived hedonic value, and perceived social value. Meanwhile, social presence plays a partial mediating role in the impact of live comments on consumers' perceived value.

**Keywords:** *Live-streaming reviews, Social presence, Consumer perceived value.*

## 1. INTRODUCTION

Since the rise of live e-commerce in China in 2016, it has shown explosive growth in just a few years. According to the 45th "Statistical Report on the Development Status of the Internet in China", as of March 2020, Chinese e-commerce live broadcast users have reached 265 million, accounting for 37.2% of online shopping users.

E-commerce live streaming is a way for the anchor to show consumers the actual product through real-time video so that viewers can understand the real product more intuitively. The commenting function of e-commerce live streaming allows users to express their opinions in the comment section in real-time. It is not only a new form of instant feedback data based on real consumption situations<sup>[1]</sup>, but also a type of online review.

Consumer perceived value, as an important factor influencing consumers' purchase decisions, has been shown to positively affect consumers' willingness to engage, purchase intention, and impulse buying behavior<sup>[2-5]</sup>. However, there are no specific studies on the impact of different dimensions of live commenting on consumers' perceived value. The comment function, as one of the important modules of e-commerce live streaming, has a non-negligible impact on consumer

behavior. Based on this, this article takes e-commerce live streaming as the research object to empirically study the impact of comments on consumers' perceived value in the live broadcast context. This paper seeks to address the following questions.

- (1) What characteristics of live commentary play a role in influencing consumers' perceived value?
- (2) What values do the different characteristics of live commentary cause consumers to perceive?
- (3) Does social presence play a role in the impact of live commentary on consumers' perceived value?

And the theoretical values and innovations of this study are as follows.

First, regarding the study of the impact of live commentary on consumers, most existing studies focus on the impact of interactivity between live streaming on consumers' perceived value, purchase intention, etc. Existing studies do not subdivide live commentary. This study divides the characteristics of live commentary into review quantity and review valence, which makes the study of the impact of live commentary on consumers a step deeper.

Second, this study introduces social presence as a mediating variable into the theoretical model. It has been shown that online reviews positively affect the social

presence and social presence positively affects consumers' perceived value. However, no studies have linked the two in the same scenario and studied them together. This study not only expands the theoretical system of social presence theory, but also expands the scope of online reviews.

**2. HYPOTHESES BASIS**

Live review is a real-time text comment located in the bottom left corner of the live stream. This study combines the characteristics of live e-commerce streaming and existing research on pop-ups and online comments and divides live comments into two dimensions: review quantity, and review valence. In this study, review quantity refers to the sum of the number of comments in the comment section of the live streaming. Review valence refers to the quality or positiveness of consumers' evaluations of products or services. When most of the online comments are positive, the overall comment valence is positive, otherwise it is negative [6]. Meanwhile, this paper classifies the consumer perceived value that lives commentary may affect into three types: utilitarian value, hedonic value, and social value. Utilitarian value refers to consumers' cognitive evaluation of the role of live commenting in helping consumers solve problems and achieve goals. Hedonic value refers to the positive emotions or feelings (such as pleasure and relaxation) that live commenting brings to consumers. Social value refers to consumers' evaluation of the value produced by the realization of communication and purpose and social interaction/quasi-social interaction [7]. This study proposes the following hypotheses.

H1a: review quantity positively affects the consumer's perceived utilitarian value

H1b: review quantity positively affects the consumer's perceived hedonic value.

H1c: review quantity positively affects the consumer's perceived social value.

H2a: review valence positively affects the consumer's perceived utilitarian value.

H2b: review valence positively affects the consumer's perceived hedonic value.

H2c: review valence positively affects the consumer's perceived social value.

H3a: social presence plays a mediating role in the effect of review quantity on the consumer's perceived utilitarian value .

H3b: social presence plays a mediating role in the effect of review quantity on the consumer's perceived hedonic value.

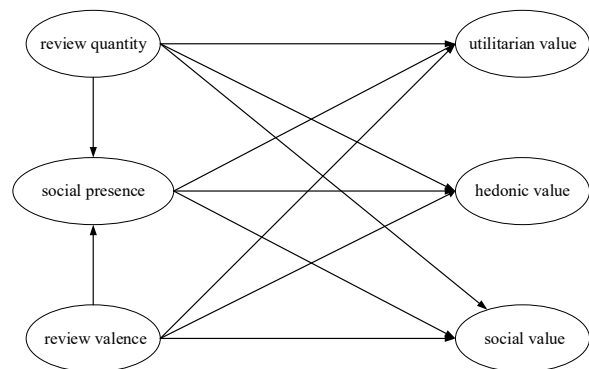
H3c: social presence plays a mediating role in the effect of review quantity on the consumer's perceived social value.

H3d: social presence plays a mediating role in the effect of review valence on the consumer's perceived utilitarian value.

H3e: social presence plays a mediating role in the effect of review valence on the consumer's perceived hedonic value.

H3f: social presence plays a mediating role in the effect of review valence on the consumer's perceived social value.

Moreover, this paper establishes the following theoretical model:



**Figure 1** Model of the impact of live commenting on consumers' perceived value

**3. RESEARCH DESIGN AND DATA ANALYSIS**

**3.1. Questionnaire Design and Research Samples**

This study adopted a questionnaire survey method to obtain data, and the scale design in the questionnaire referred to the mature scales in existing studies. The items in the questionnaire were all measured on a 5-point Likert scale, from 1 to 5, indicating "completely disagree" to "completely agree" respectively. To ensure the validity of the data, requirements were set at the beginning of the questionnaire to identify the people who had participated in live e-commerce.

We distributed the initial questionnaire to 98 respondents for pre-study, of which 80 were valid. The collected data were used to test the reliability and validity of each variable. Both the reliability and validity met the requirements, indicating that the questionnaire could be used in the formal study.

**3.2. Data Collection and Sample Description**

This study collected questionnaires through the online platform named "Wenjuanxing", a platform

providing functions equivalent to Amazon Mechanical Turk. A total of 500 questionnaires were distributed and 450 were returned, with a return rate of 90%. Among them, there were 348 valid questionnaires, with an effective rate of 77.33%. The sample characteristics of the questionnaires are shown in Table 1.

As shown in Table 1, the respondents were balanced between men and women, and their ages were mainly distributed between 21 and 35 years old. Most of them have college and bachelor's degrees. Their occupations

are mainly office workers and students, and their monthly income is mostly below 10,000 yuan. Most of these users are young people who have certain purchasing abilities but are interested in discounts on goods in live e-commerce, which is in line with the actual situation of the main group of live e-commerce. And most of the respondents have been in contact with live e-commerce for more than 1 year, and have a practical understanding of live e-commerce. Thus, this sample can better reflect the impact of live streaming reviews on consumers' perceived value.

**Table 1.** Descriptive Statistics of Demographic Variables

Item	Category	Frequency	Percentage /%
Gender	Male	178	51.10
	Female	170	48.90
Age	20 years old and below	9	2.60
	21-25 years old	156	44.80
	26-35 years old	130	37.40
	36-40 years old	41	11.80
	Over 41 years old	12	3.40
Academic qualifications	High school (including junior college) and below	22	6.30
	College	134	38.50
	Undergraduate	159	45.70
	Master and above	33	9.50
Career	Students	110	31.60
	Commuters	130	37.40
	Freelancer	67	19.30
	Other	41	11.80
Monthly income	Less than 1000 RMB	118	33.90
	1000-5000RMB	67	19.30
	5000-10000RMB	97	27.90
	10000RMB or more	66	19.00
Average monthly live shopping spend	Under 100 RMB	90	25.90
	100-500RMB	178	51.10
	500-1000RMB	49	14.10
	Over 1000 RMB	31	8.90
Exposure to live e-commerce hours	Less than 6 months	57	16.40
	6 months - 1 year	49	14.10
	1 year - 2 years	127	36.50
	More than 2 years	115	33.00
Total		348	100.00

**3.3. Reliability Analysis**

In this study, the reliability of the scale was tested by Cronbach’s  $\alpha$  coefficient and SPSS 24.0 software was used for reliability analysis. The results of Cronbach’s  $\alpha$  coefficient analysis are shown in Table 2. As shown in Table 2, the Cronbach’  $\alpha$  values for the scale as a whole as well as for each variable were greater than 0.7, indicating good internal consistency of the scale in this study.

**Table 2.** Reliability Analysis Results

Variables	Number of question items	Cronbach’ $\alpha$
Review Quantity	4	0.915
Review Valence	3	0.916
Social Presence	6	0.918
Utilitarian Value	4	0.901
Hedonic Value	6	0.92
Social Value	5	0.933
All Variables	28	0.955

**3.4. Validity Analysis**

The questionnaire used in this study was based on well-established scales from existing studies, and the hypothesis model had good theoretical support. Therefore, it can be considered that this paper has good content validity. In this paper, we first conducted KMO and Bartlett sphericity examination for all variables, and the KMO values for each variable were 0.824 for review quantity, 0.709 for review valence, 0.913 for social presence, 0.821 for utilitarian value, 0.904 for hedonic value, and 0.883 for social value, with an overall KMO value of 0.936, all with a significance of 0.000, indicating that The data of the live review scale are suitable for factor analysis.

This study used AMOS 24.0 software to test the validity of the measurement model by conducting a validated factor analysis.

First, we examined the structural validity of the measurement model. The fit indices of this measurement model are shown in Table 3. From Table 3, the value of  $\chi^2/df$  is 1.723, which is less than 3, indicating an ideal fit. The value of RMSEA is 0.046, which is less than 0.05, indicating a good fit. The value of CFI is 0.970, the value of IFI is 0.970, and the value of TLI is 0.966, all of which are greater than 0.9. The values of GFI are 0.893 and AGFI are 0.870, both of which are less than 0.9, but both are close to 0.9, which are within the acceptable range, indicating that the adaptation is qualified. Overall, the model is well adapted.

**Table 3.** Table of overall fitting coefficients

$\chi^2/df$	RMSEA	GFI	AGFI	CFI	IFI	TLI
1.723	0.046	0.893	0.870	0.970	0.970	0.966

Next, we examined the internal consistency and convergent validity of the measurement model. larger CR values indicate a high correlation between indicators. Generally, a CR value greater than 0.7 indicates a good internal consistency of the measurement model. The average variance extracted (AVE) is an indicator of convergent validity. Generally, AVE greater than 0.5 indicates that the measurement model has good convergent validity. As can be seen from Table 4, the

factor loadings of each latent variable for the review quantity, review valence, social presence, utilitarian value, hedonic value, and social value for each topic are all greater than 0.6, indicating that each latent variable is highly representative of the topic to which it belongs. In addition, the AVE of each latent variable is greater than 0.5 and the combined reliability is greater than 0.7, indicating that the convergent validity is ideal and the measurement model has good intrinsic quality.

**Table 4.** Factor loadings

Paths	Standard load	AVE	CR
A1 ← Review Quantity	0.819	0.735	0.917
A2 ← Review Quantity	0.739		
A3 ← Review Quantity	0.931		
A4 ← Review Quantity	0.925		
B1 ← Review Valence	0.917	0.801	0.923

B2	←	Review Valence	0.971		
B3	←	Review Valence	0.787		
C1	←	Social Presence	0.755		
C2	←	Social Presence	0.815		
C3	←	Social Presence	0.893	0.654	0.918
C4	←	Social Presence	0.748		
C5	←	Social Presence	0.746		
C6	←	Social Presence	0.880		
D1	←	Utilitarian Value	0.762		
D2	←	Utilitarian Value	0.947	0.710	0.907
D3	←	Utilitarian Value	0.883		
D4	←	Utilitarian Value	0.764		
F1	←	Hedonic Value	0.779		
F2	←	Hedonic Value	0.755		
F3	←	Hedonic Value	0.891	0.661	0.921
F4	←	Hedonic Value	0.917		
F5	←	hedonic value	0.764		
F6	←	Hedonic Value	0.754		
G1	←	Social Value	0.797		
G2	←	Social Value	0.864		
G3	←	Social Value	0.927	0.737	0.933
G4	←	Social Value	0.921		
G5	←	Social Value	0.772		

Finally, there is a test of discriminative validity. This study uses the square root of average variance extraction (AVE) to compare with the correlation coefficient between the latent variables to judge. When the square root of AVE is greater than the correlation coefficient between the latent variables, it indicates that the model has good discriminative validity. It can be seen from Table 5 that review quantity, review valence, social

presence, utilitarian value, hedonic value, and social value are all significantly correlated ( $p < 0.001$ ), and they are all less than the square root of the corresponding AVE, indicating that each potential The variables have a certain correlation and a certain degree of discrimination between each other, which means that the discriminative validity of the scale data is ideal.

**Table 5.** Distinct validity

	Review Quantity	Review Valence	Social Presence	Utilitarian Value	Hedonic Value	Social Value
Review Quantity	0.7348					
Review Valence	0.474***	0.801				
Social Presence	0.553***	0.477***	0.6537			
Utilitarian Value	0.534***	0.447***	0.514***	0.7102		
Hedonic Value	0.577***	0.567***	0.508***	0.501***	0.6606	
Social Value	0.552***	0.550***	0.587***	0.586***	0.546***	0.7371
Square Root of AVE	0.857	0.895	0.809	0.843	0.813	0.859

\*\*\* represents p-values less than 0.001, and the diagonal line is the AVE mean-variance extracted

### 3.5. Structural Equation Modeling

#### 3.5.1. Overall Model Fit Test

In this study, the AMOS 24.0 software was used to test the fit indicators of the structural equation model fitness. The results are shown in Table 6. The  $\chi^2/df$  is

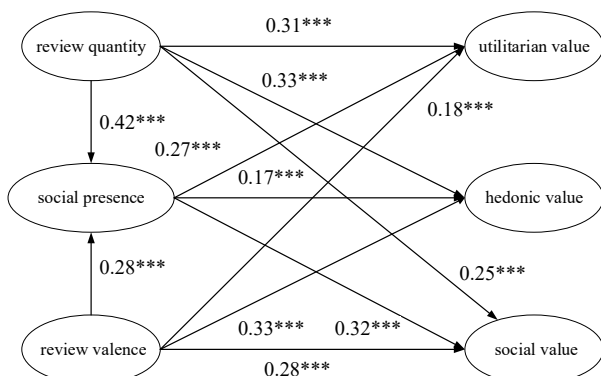
1.807, which is lower than 3. The RMSEA is 0.048, which is less than the standard 0.05. The GFI is 0.886 and the AGFI is 0.864, which are not very good, but both are close to 0.9. The CFI is 0.967, the IFI is 0.967, and the TLI is 0.963, which are all greater than 0.9. Overall, the structural model of this study fits well. The hypothesis testing can be carried out in the next step.

**Table 6.** Evaluation of The Overall SEM Fitvalidity

Goodness-of-fit index	$\chi^2/df$	RMSEA	GFI	AGFI	CFI	IFI	TLI
Fitted value	1.807	0.048	0.886	0.864	0.967	0.967	0.963
Judgment Criteria	<3.000	<0.050	>0.900	>0.900	>0.900	>0.900	>0.900

#### 3.5.2. Model Hypothesis Testing

This study hypothesized that review quantity and review valence positively influenced perceived utilitarian value, perceived hedonic value, and perceived social value. Social presence plays a mediating role in the influence of review quantity and review valence on perceived utilitarian value, perceived hedonic value, and perceived social value. The results of the model are shown in Figure 2.



**Figure 2** Standardized structural equation model path coefficients

From the results of the runs, the standard regression coefficients for all paths were significant. This indicates that the research hypotheses H1a, H1b, H1c, H2a, H2b, and H2c were supported, as shown in Table 7. The results show that the coefficient of the path between review quantity and utilitarian value is 0.31 and reaches the significance level of 0.01, so hypothesis H1a is valid. The path coefficient of review quantity and hedonic value is 0.33 and reaches the significance level of 0.01, so hypothesis H1b holds. The path coefficient of review quantity and social value is 0.25, which reaches the significance level of 0.01, so hypothesis H1c holds. The path coefficient of review valence and utilitarian value is 0.18 and reaches the significance level of 0.01, so hypothesis H2a holds. The coefficient of the path between review valence and hedonic value is 0.33 and reaches the significance level of 0.01, so hypothesis H2b holds. The coefficient of the path between review valence and social value is 0.28, which reaches the significance level of 0.01, so hypothesis H2c is valid. The effects of review quantity and review valence on perceived utilitarian value, perceived hedonic value, and perceived social value were significant.

**Table 7.** Results of Direct Impact Hypothesis Testing

Paths	Standardization factor	S.E.	C.R.	P	Significance
H1a: Review Quantity → Utilitarian Value	0.309	0.052	5.133	***	Significant
H1b: Review Quantity → Hedonic Value	0.328	0.049	5.758	***	Significant
H1c: Review Quantity → Social Value	0.248	0.057	4.469	***	Significant
H2a: Review Valence → Utilitarian Value	0.179	0.058	3.21	**	Significant
H2b: Review Valence → Hedonic Value	0.332	0.055	6.11	***	Significant
H2c: Review Valence → Social Value	0.285	0.065	5.415	***	Significant

Note: \*\*\* represents  $p < 0.001$ , \*\* represents  $p < 0.01$ ; same below.

3.5.3. A Test of the Mediating Effect of Social Presence

The Bootstrap method was used in this study to investigate the mediating role of social presence in the

effects of review quantity and review valence on perceived utilitarian value, perceived hedonic value, and perceived social value. Whether the confidence interval contains 0 at 95% accuracy was used as the criterion for judging the mediating effect. The results are shown in Table 8.

Table 8. Results of mediated effects of social presence

Paths	Effect Value	SE	Bias-corrected 95% CI			Percentile 95% CI		
			Lower	Upper	P	Lower	Upper	P
Review Quantity - Social Presence - Utilitarian Value	0.073	0.034	0.015	0.151	0.015	0.012	0.147	0.02
Review Quantity - Social Presence - Hedonic Value	0.112	0.04	0.043	0.201	0.002	0.038	0.194	0.002
Review Quantity - Social Presence - Social Value	0.135	0.036	0.075	0.221	0	0.071	0.212	0
Review Valence - Social Presence - Utilitarian Value	0.048	0.024	0.01	0.106	0.014	0.008	0.101	0.02
Review Valence - Social Presence - Hedonic Value	0.074	0.03	0.027	0.148	0.001	0.023	0.137	0.002
Review Valence - Social Presence - Social Value	0.089	0.029	0.041	0.157	0	0.039	0.154	0

As can be seen from Table 8, the Bootstrap test intervals for review quantity and review valence to ultimately affect utilitarian value, hedonic value, and social value through social presence do not contain 0, indicating the existence of a mediating effect. Since review quantity and review valence have direct effects on utilitarian value, hedonic value and social value, the mediating effect of social presence is a partial mediating effect. Hypotheses H3a, H3b, H3c, H3d, H3e, and H3f all hold.

4. CONCLUSION

This paper introduces the theory of social presence and empirically analyzes the impact of live commentary on consumers' perceived value. The research conclusions are as follows.

First, review quantity can positively affect consumers' perceived utilitarian value, perceived hedonic value, and perceived social value.

Second, review valence can positively affect consumers' perceived utilitarian value, perceived hedonic value, and perceived social value.

Third, social presence plays a mediating role in the effect of review quantity and review valence on consumers' perceived value (including perceived utilitarian value, perceived hedonic value, and perceived social value).

AUTHORS' CONTRIBUTIONS

Chunxiao Liu contributed to the conception of the study, performed the experiment, contributed to analysis and manuscript preparation.

Hao Zhang helped perform the analysis with constructive discussion.

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