Research on Customers' Impulsive Purchase Intentions: Symbolic Elements in Farmer-assisting Live Streaming

Weiping Yang[#,*], Tianqi Wu[#], Hongbin Zhang

School of Economics and Management, Ningxia University, Yinchuan, China, 750021

* Corresponding Author Email: ywp031125@163.com

#These authors contributed equally.

Abstract. With the rapid development of the Internet, farmer-assisting live streaming has emerged as a new model combining agricultural products with e-commerce. This study, based on the S-O-R theory, constructs a model of "symbolic elements in the context of farmer-assisting live streaming" and introduces moral identity as a moderating variable. Using SPSS 27.0 and SmartPLS statistical analysis software for empirical testing, the results show that symbolic elements significantly and positively influence customers' impulsive purchase intentions through positive emotions and perceived trust, and moral identity significantly moderates this relationship. This paper provides new research perspectives for the sustainable development of the live e-commerce model.

Keywords: Farmer-assisting live streaming, Symbolic elements, Impulse purchase intention.

1. Introduction

The integration of e-commerce live streaming with agricultural product sales has given rise to a new marketing model known as assistance live streaming. This model, a subset of live streaming marketing, leverages the actual development conditions of local rural areas. By introducing this mode of development, it can stimulate local rural development and revitalize the countryside [1]. E-commerce assistance live streaming has become a crucial sales channel for agricultural products and a vital path for rural revitalization in China, continuously injecting new energy into rural revitalization efforts.

Currently, most scholars focus their research on the development models and implementation paths of assistance live streaming. However, there is a significant gap in the study of symbols within the context of assistance live streaming. Existing studies, such as those by Tang et al. [2] and Li et al. [3], have systematically explored new models in live streaming of agriculture assistance and proposed various integrated communication marketing strategies. Despite the high theoretical level of current research, there is a lack of in-depth exploration into customer impulsive purchase behavior within the context of assistance live streaming, particularly the impact of symbolic communication on purchasing behavior.

To address the existing research gaps, this paper applies the S-O-R(Stimulus-Organism-Response) theory to study the influence of rural cultural symbols on customers' impulsive purchase intentions in the context of assistance live streaming. Additionally, it introduces arousal and perceived trust as mediating variables and moral identity as a moderating variable to explore the factors influencing impulsive purchase in assistance live streaming. The findings of this study are expected to provide valuable insights and suggestions for the healthy and sustainable development of live streaming platforms and continue to leverage the advantages of assistance live streaming in rural revitalization.

2. Data and Methods

2.1. Theory model

The S-O-R (Stimulus-Organism-Response) theory is widely used in customer behavior research and live shopping fields [4,5]. This paper will use the S-O-R theory to study the stimuli generated by rural cultural symbols in farmer-assisting live streaming and their impact on customer perception.

These stimuli evoke positive emotions and perceived trust in customers, which in turn influence their subsequent impulse purchase intentions. In this context, rural cultural symbols in farmer-assisting live streaming act as the S (Stimulus), customers' positive emotions and perceived trust serve as the O (Organism), and customers' impulse purchase intentions represent the R (Response). This theoretical framework will be used to demonstrate the relationship between external stimuli and behavioral responses.

2.2. Research Hypothesis

2.2.1. Rural Cultural Symbols and Positive Emotions

The rustic image and rural-style attire of assistance to farmers live streamers evoke positive emotions in the fast-paced modern life. Atmosphere cues explain the scene symbols, as the layout and interaction in the live streaming room create a pleasant atmosphere, stimulating impulse purchase intentions [6]. Additionally, interactivity explains the body language symbols, where live streamers reduce information asymmetry through professional information and interaction, promoting changes in customer emotions and purchase intentions [7].

Based on this, the following hypotheses are proposed:

H1: The simplicity of live streamer positively influences customers' positive emotions.

H2: The atmosphere cues positively influence customers' positive emotions.

H3: The interactivity of the live streamer positively influences customers' positive emotions.

2.2.2. Rural Cultural Symbols and Perceived Trust

Regarding rustic image, as a mediator between the product and the customer, the live streamer's authenticity and rational presentation can enhance customers' psychological recognition and trust. The rustic image of farmer-type live streamers aligns with agricultural products, helping to increase customer trust. In terms of atmosphere cues and interactivity, live streaming sites are often in fields or factories, showcasing the production process of agricultural products, increasing authenticity and trust. Farmer-type live streamers are familiar with planting details and can provide more specific product descriptions, enhancing customer trust.

Based on this, the following hypotheses are proposed:

H4: The simplicity of live streamer positively influences customers' perceived trust.

H5: The atmosphere cues positively influence customers' perceived trust.

H6: The interactivity of the live streamer positively influences customers' perceived trust.

2.2.3. Positive Emotions and Customer Impulse Purchase Intentions

Positive emotions play a unique role in the process of customer impulse purchase. Impulse purchase is not only a purchasing behavior but also an emotional experience, where customers often feel excitement, psychological satisfaction, a sense of accomplishment, and excitement [8]. Studies have shown that compared to customers who do not make purchases, those who engage in impulse purchase are more emotional; thus, emotional arousal is an important driver of impulse purchase [9].

Based on this, the following hypothesis is proposed:

H7: Positive emotions positively influence customer impulse purchase intentions.

2.2.4. Perceived Trust and Customer Impulse Purchase Intentions

Positive interactions between live streamers and customers on farmer-assisting live streaming platforms significantly help increase customer trust and goodwill. On one hand, live streamers attract customer attention through immediate, vivid, and diverse product displays, leading customers to spend more time watching product introductions, potentially encountering trustworthy product recommendations. At the same time, customers can communicate with live streamers in real-time, perceive pleasure, and obtain more information they wish to know, ultimately leading to impulse purchase behavior.

Based on this, the following hypothesis is proposed:

H8: In farmer-assisting live streaming, customers' perceived trust significantly positively influences their impulse purchase intentions.

2.2.5. The Mediating Role of Perceived Trust

Perceived trust mediates the influence on customers' emotional attitudes and impulse purchase. Trust has a positive impact on online shopping behavior [10], especially in farmer-assisting live streaming, where the rustic image of live streamer and the live streaming atmosphere enhance customer trust, reducing perceived risk and facilitating impulse purchase. The interaction process increases product credibility, strengthening trust, thereby driving customer purchasing decisions.

Therefore, the following hypotheses are proposed:

H9a: In farmer-assisting live streaming, perceived trust mediates the relationship between the live streamer's sense of simplicity of live streamer and customers' impulse purchase intentions.

H9b: In farmer-assisting live streaming, perceived trust mediates the relationship between atmosphere cues and customers' impulse purchase intentions.

H9c: In farmer-assisting live streaming, perceived trust mediates the relationship between the live streamer's interactivity and customers' impulse purchase intentions.

2.2.6. The Mediating Role of Positive Emotions

Positive emotions mediate customer impulse purchase. Research shows that pleasant emotions triggered by the shopping environment are a direct cause of impulse purchase [11]. In farmer-assisting live streaming, the rustic image of the live streamer, the live streaming atmosphere, and interactivity can all evoke positive emotions in customers, such as excitement, surprise, and satisfaction. These emotional responses increase customers' desire to purchase and lead to impulse purchase. Existing studies widely recognize the important role of positive emotions in impulse purchase [12].

Based on this, the following hypotheses are proposed:

H10a: In farmer-assisting live streaming, positive emotions mediate the relationship between the live streamer's simplicity and customers' impulse purchase intentions.

H10b: In farmer-assisting live streaming, positive emotions mediate the relationship between atmosphere cues and customers' impulse purchase intentions.

H10c: In farmer-assisting live streaming, positive emotions mediate the relationship between the live streamer's interactivity and customers' impulse purchase intentions.

2.2.7. The Moderating Role of Moral Identity

In farmer-assisting live streaming, due to its unique public welfare attribute, customers are influenced by moral emotions. Customers with high moral identity often exhibit a high degree of consistency in moral cognition and behavior, with their repeat purchase intentions being less affected by social presence. Studies have shown that in farmer-assisting live streaming, strong moral atmosphere and emotions can trigger moral emotional fluctuations in customers, thereby affecting their impulse purchase intentions [13]. The level of moral identity can moderate the relationship between positive emotions and perceived trust and impulse purchase intentions.

Based on this, the following hypotheses are proposed:

H11a: Moral identity moderates the relationship between positive emotions and customers' impulse purchase intentions.

H11b: Moral identity moderates the relationship between perceived trust and customers' impulse purchase intentions.

2.3. Model Construction

This study aims to expand on the SOR (Stimulus-Organism-Response) theoretical model by incorporating mechanisms of positive emotions and perceived trust to investigate their roles in the customer impulse purchase intention model within the context of farmer-assisting live streaming. The foundational theoretical model for this study is shown in Figure 1.

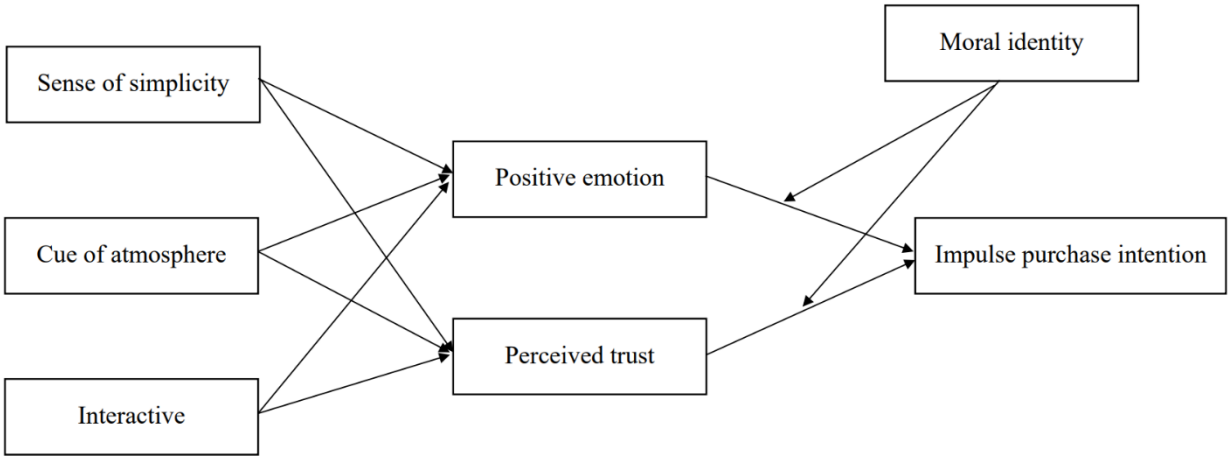

Figure 1. Theoretical model of symbolic elements in the farmer-assisting live streaming

2.4. Scale Design

2.4.1. Scale Design for Independent Variable: Measurement of Rural Cultural Symbols

This paper aims to explore and analyze the impact of symbolic elements in the context of assistance to farmers live streaming on customer impulse purchase intentions and the underlying theoretical mechanisms. Although existing research covers live streaming symbolic elements, in-depth analysis in the context of assistance to farmers live streaming remains unexplored.

To ensure the representativeness of the sample, this study selected respondents from Ningxia University who have watched assistance to farmers live streams for interviews. To obtain as much relevant interview material as possible, three groups from Ningxia University were interviewed: undergraduate students, postgraduate students, and university faculty. By collecting interview data from 30 users who have watched assistance to farmers live streams, the study summarized and conceptualized the symbolic elements in the context of assistance to farmers live streaming, identifying three main dimensions: character symbols, scene symbols, and body language symbols.

This study adopts the sequential exploratory research method [14], aiming to define the concept and dimensions of cultural symbolic elements in the context of assistance to farmers live streaming and explore their influence mechanisms and potential boundary conditions on impulse purchase intentions. This method comprises three steps: open coding, axial coding, and selective coding. Upon completing the scale development and questionnaire testing, minor adjustments to the wording of scale items were made based on issues reflected during the survey process and results. Finally, after discussions with the tutor, corresponding measurement indicators were developed for the three dimensions of symbolic elements.

2.4.2. Scale Design for Mediating Variables, Dependent Variables, and Moderating Variables

To test the relationships among the independent variables, dependent variables, mediating variables, and moderating variables in this study, it is first necessary to scientifically measure these variables. The measurement indicators for the independent variable—rural cultural symbols in the context of assistance to farmers live streaming—are derived from the aforementioned section in this paper. For the mediating variables—perceived trust and positive emotions, the dependent variable—customer impulse purchase intentions, and the moderating variable—moral identity, the measurement indicators are sourced from existing theoretical research.

Positive emotions are derived from the scales by Youn and Faber [15], with a total of 3 items. The 3 dimensions of perceived trust are measured using the scale by Davis et al. [16], with a total of 3 items. The scale for impulse purchase intentions adopts the scale by Kacen and Lee et al. [17], with a total of 4 items. Moral identity is adapted from the scale by Aquino and Ree [18], with a total of 3 items.

All measurement items use a 5-point Likert scale, where 1 indicates strong disagreement and 5 indicates strong agreement. Since the survey is conducted in China, this paper adopts the back-translation method.

2.5. Questionnaire Design

2.5.1. Data Collection and Sample

This paper considers the influence of rural cultural symbols and positive emotions in assistance to farmers live streaming on customer impulse purchase behavior and conducts a preliminary survey. A total of 87 surveys were collected, with 73 valid responses (83.9%). The collected data underwent reliability and validity tests, and the questionnaire was modified based on the survey results. The modifications included deleting two items, revising the translation of three items to improve estimated reliability, and adding a screening question to determine whether respondents had made impulse purchases in agricultural product live streaming rooms.

The sampling process was conducted from January 2024 to March 2024. This study used the professional online questionnaire platform Wenjuanxing to generate the questionnaire. The survey was distributed both online and offline. This paper received a total of 636 responses. Since this study focuses on people's continuous consumption intention in agricultural product live streaming rooms, a preliminary question was set to filter out those who had not made impulse purchases in such live streams. Respondents who initially selected "No" for the question "Have you ever made an impulse purchase of an agricultural product in an assistance to farmers live stream?" were directed to the end of the questionnaire, thus not completing it. Additionally, after excluding respondents with overly short response times or identical answer choices, 149 respondents (23.4%) were removed from the sample, leaving 487 valid respondents (76.6%) for analysis.

Table 1 details the demographic information of the respondents. Among the valid samples, 38.2% were male, and 61.8% were female. Most respondents were under 40 years old (81.4%) and had received higher education (88%).

Table 1. Demographic information of respondents

Comparison	Power	Forecasting
Age	<20	27
	21-30	171
	31-40	198
	41-50	64
	>50	27
Gender	Male	186
	Female	301
Education level	Below high school	22
	Junior college	42
	Undergraduate or bachelor	370
	Postgraduate or above	53
Monthly income	<2000	62
	2001-5000	87
	5001-8000	135
	8001-11000	114
	>11000	89
Live streaming platform for purchase agricultural productions	Douyin Live	341
	Quick worker Live	53
	WeChat Live	29
	Taobao Live	55
	Others	9

2.5.2. Exploratory Factor Analysis

This study primarily analyzes the measurement scales for the independent variable. Firstly, an exploratory factor analysis (EFA) was conducted on the survey data. Principal component analysis (PCA) was used to extract the factors, and the varimax method was applied for factor rotation. The KMO value was 0.828, and Bartlett's test of sphericity was significant ($p < 0.001$), indicating that the data were suitable for exploratory factor analysis.

Factors were extracted based on the principal component analysis method. Items with factor loadings less than 0.5 were deleted, as well as items with communalities less than 0.5 and those with multiple loadings. Finally, among the items that were not deleted, 9 items were retained, extracting 3 factors. The final results of the exploratory factor analysis are shown in Table 2.

Table 2. Factor loadings of measurement items

Item	SE	CA	IT
SE1	0.931		
SE2	0.949		
SE3	0.855		
CA1		0.922	
CA2		0.949	
CA3		0.935	
IT1			0.881
IT2			0.914
IT3			0.879

2.5.3. Confirmatory Factor Analysis

In this stage, SmartPLS 3.0 software was used to conduct confirmatory factor analysis (CFA) on the survey data. The purpose was to test the fit between the conceptual model obtained from exploratory factor analysis and the actual observed data.

(1) Reliability Analysis

As shown in Table 3, the Cronbach's α coefficient for perceived social value of new media users is 0.850, for perceived emotional value of new media users is 0.879, for perceived cognitive value of new media users is 0.899, and for perceived interactive value of new media users is 0.846. All four dimensions have Cronbach's α coefficients greater than 0.70, indicating that the questionnaire has good reliability.

(2) Validity Analysis

As shown in Table 3, all item loadings are greater than 0.7, and the AVE square root is greater than 0.8, indicating that the questionnaire has good convergent validity.

Table 3. Reliability and convergent validity analysis

Construct	Item	Factor loading	AVE	Composite Reliability	Cronbach's Alpha
Sense of simplicity (SE)	SE1	0.931	0.833	0.937	0.840
	SE2	0.949			
	SE3	0.855			
Cue of atmosphere (CA)	CA1	0.922	0.875	0.955	0.929
	CA2	0.949			
	CA3	0.935			
Interactivity (IT)	IT1	0.881	0.794	0.920	0.870
	IT2	0.814			
	IT3	0.879			

As shown in Table 4, the Pearson correlation coefficients between the latent variables are all smaller than the square root of the corresponding variable's AVE value, indicating that the questionnaire has good discriminant validity.

Table 4. Discriminant validity analysis

	SE	CA	IT
SE	**0.913**		
CA	0.723	**0.936**	
IT	0.785	0.860	**0.891**

Notes: Diagonal elements (in bold) are the square root of AVEs of constructs.

3. Results and Discussion

PLS-SEM was used to test the research model and hypotheses. Specifically, this paper used SmartPLS 3.0 software for data analysis.

3.1. Measurement Model

The reliability and validity of the measurement model for the overall sample were analyzed, with results shown in Table 5. Cronbach's α values for all constructs ranged from 0.752 to 0.840, and composite reliability values ranged from 0.860 to 0.904, indicating good reliability levels. All factor loadings were above 0.7, and AVE values were above 0.5, indicating satisfactory convergent validity.

Table 5. Reliability and convergent validity analysis

Construct	Item	Factor loading	AVE	Composite Reliability	Cronbach's Alpha
Sense of simplicity (SE)	SE1	0.882	0.759	0.904	0.840
	SE2	0.907			
	SE3	0.823			
Cue of atmosphere (CA)	CA1	0.824	0.677	0.863	0.761
	CA2	0.834			
	CA3	0.810			
Interactivity (IT)	IT1	0.850	0.669	0.858	0.752
	IT2	0.812			
	IT3	0.791			
Positive emotions (PE)	PE1	0.867	0.739	0.895	0.823
	PE2	0.858			
	PE3	0.854			
Moral identity (MI)	MI1	0.805	0.672	0.860	0.756
	MI2	0.820			
	MI3	0.834			
Perceived trust (PT)	PT1	0.827	0.678	0.894	0.842
	PT2	0.846			
	PT3	0.817			
	PT4	0.804			
Impulse purchase intention (IP)	IP1	0.863	0.729	0.890	0.815
	IP2	0.842			
	IP3	0.857			

Finally, as shown in Table 6, in all cases, the square root of AVE (numbers on the diagonal of the matrix) was greater than the correlations between constructs, meeting the Fornell-Larcker criterion. Therefore, the model is reliable and valid.

Table 6. Discriminant validity analysis

	SE	CA	IT	PE	MI	PT	IB
SE	**0.826**						
CA	0.609	**0.823**					
IT	0.657	0.675	**0.818**				
PE	0.608	0.697	0.722	**0.860**			
MI	0.629	0.763	0.667	0.714	**0.820**		
PT	0.659	0.757	0.720	0.790	0.749	**0.824**	
IP	0.614	0.742	0.662	0.740	0.709	0.786	**0.854**

Notes: Diagonal elements (in bold) are the square root of AVEs of constructs.

3.2. Structural Model

Hypotheses were tested using SmartPLS 3.0. The structural model included model fit and path coefficients. Figure 2 shows the results of the estimated structural model for the entire sample.

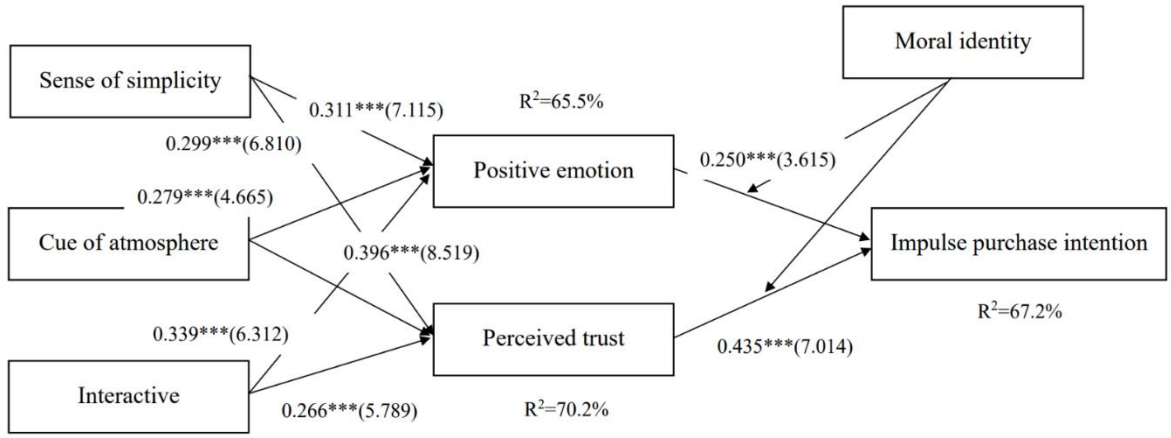

Figure 2. Structural model analysis result

The model explained 67.2% of the variance in customers' impulse purchase intentions for agricultural products in the live streaming scenario. Additionally, 65.5% and 70.2% of the variance was explained for customers' positive emotions and perceived trust, respectively. Specifically, customers' positive emotions were significantly related to the simplicity of the live streamer (β=0.37, t=7.0), atmosphere cues in the live streaming room (β=0.48, t=9.8), and live streamer interactivity (β=0.48, t=9.8), supporting H1, H2, and H3. Correspondingly, customers' perceived trust was significantly related to the simplicity of the live streamer (β=0.26, t=4.7), atmosphere cues in the live streaming room (β=0.35, t=7.0), and live streamer interactivity (β=0.31, t=6.7), supporting H4, H5, and H6. Customers' positive emotions and perceived trust were significantly positively related to impulse purchase intentions (β=0.32, t=4.8; β=0.54, t=8.9), supporting H7 and H8.

Table 7. Structural equation modeling results of the hypotheses

Hypotheses	Paths	Path coefficients	T- values	P- values	Supported?
H1	SE→PE	0.311	7.115	***	YES
H2	CA→PE	0.279	4.665	***	YES
H3	IT→PE	0.339	6.312	***	YES
H4	SE→PT	0.299	6.810	***	YES
H5	CA→PT	0.396	8.519	***	YES
H6	IT→PT	0.266	5.786	***	YES
H7	PE→IP	0.250	3.615	***	YES
H8	PT→IP	0.435	7.014	***	YES

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The support for these hypotheses indicates that in the context of live streaming for agricultural assistance, symbolic elements have a significant positive impact on customers' perceived trust and positive emotions. Personal symbols enhance trust and closeness by presenting a farmer's image and the live streamer's simplicity; scene symbols such as rural landscapes and agricultural product displays enhance viewers' emotional engagement and resonance; interactive body language symbols, through dialect, humor, and real-time interaction, further strengthen trust and evoke positive emotions. These combined effects highlight the importance of symbolic elements in shaping customers' cognition and behavior in agricultural assistance live streaming. Additionally, the study verifies the significant impact of positive emotions and perceived trust on impulse purchase intentions. During agricultural assistance live streaming, positive emotions and trust in the live streamer and their products significantly enhance impulse purchase tendencies, emphasizing the importance of these factors in driving customer purchasing behavior in this context.

3.3. Mediation Effect in the Research Model

This paper used the bootstrap method to test mediation effects, with 5000 samples tested using SmartPLS 3.0. If zero is outside the 95% confidence interval, the estimate of the indirect effect is significant [19]. However, if zero falls within the confidence interval, there is no significant mediation effect. As shown in Table 10, positive emotions mediate the relationship between simplicity and impulse purchase intentions (95% CI [0.034, 0.129]), atmosphere cues and impulse purchase intentions (95% CI [0.026, 0.127]), and interactivity and impulse purchase intentions (95% CI [0.037, 0.138]). Customers' perceived trust mediates the relationship between simplicity and impulse purchase intentions (95% CI [0.081, 0.186]), atmosphere cues and impulse purchase intentions (95% CI [0.111, 0.243]), and interactivity and impulse purchase intentions (95% CI [0.069, 0.167]).

Therefore, H9a, H9b, H9c, H10a, H10b, and H10c are confirmed.

Table 8. Results of intermediate effect test

Hypotheses	Intermediary path	Indirect effect coefficient	95% CI		Results
			Upper limit	Lower limit	
H9a	SE→PT→IP	0.130***	0.081	0.186	Supported
H9b	CA→PT→IP	0.172***	0.111	0.243	Supported
H9c	IT→PT→IP	0.116***	0.069	0.167	Supported
H10a	SE→PE→IP	0.078***	0.034	0.129	Supported
H10b	CA→PE→IP	0.168***	0.026	0.127	Supported
H10c	IT→PE→IP	0.085***	0.037	0.138	Supported

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The support for these hypotheses indicates that positive emotions and perceived trust play significant mediating roles in the influence of symbolic elements on impulse purchase intentions. Specifically, in the context of agricultural assistance live streaming, symbolic elements evoke positive emotions in customers, which in turn enhance their trust in the live streamer and the promoted products, thereby increasing their impulse purchase intentions. Symbolic elements, such as simple personal images, warm scene atmospheres, and highly interactive body language symbols, effectively elicit positive emotions in customers while increasing their trust in the live streamer. The establishment of these emotions and trust partially explains how symbolic elements indirectly influence customers' impulse purchasing behavior.

3.4. Moderating Effect in the Research Model

The study also tested the slopes of all levels of conditional effects to examine under what conditions the slope of positive emotions on customers' impulse purchase intentions is positive or significant. For individuals with high moral identity, the slope remained significant ($\beta = 0.242$, $p < 0.01$). For

individuals with low moral identity, the slope was also positive and significant for all individuals ($\beta = 0.089$, $p < 0.01$). In summary, hypothesis H11a is supported.

Considering that the moderating coefficients are estimated simultaneously, this paper also examined under what conditions the slope of perceived trust on purchase intentions is positive or significant. For individuals with high levels of self-enhancement, the slope remained significant ($\beta = 0.582$, $p < 0.01$) ($\beta = 0.918$, $p < 0.01$). In summary, hypothesis H11b is supported.

The results of the moderation effect tests indicate that moral identity significantly moderates the relationship between symbolic elements and customers' impulse purchase intentions in the context of agricultural assistance live streaming. Customers with low moral identity levels experience strong moral emotion fluctuations during agricultural assistance live streaming due to the special moral attributes of the context. To enhance their moral identity, customers with low moral identity levels will increase their impulse purchase intentions for agricultural products. Therefore, agricultural assistance live streaming can convey its special moral attributes to customers, prompting them to perform actions that express moral awareness, thereby promoting their impulse purchase intentions.

4. Conclusions

This study adopts a semiotic perspective to construct a theoretical framework for factors influencing customer impulse purchase in farmer-assisting live streaming, expanding the application of the SOR model and introducing moral identity as a moderating variable. The findings enhance the understanding of customer behavior in this context and provide new theoretical and practical insights. Future research should incorporate additional variables, explore the relative impact of different symbols, and investigate the interaction between symbols and emotions. Additionally, the effects of emerging technologies like VR and AR in farmer-assisting live streaming should be examined to further enrich the field.

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