

Study on the Influence of Live Broadcast Characteristics on Customer Value Co-Creation Behaviors: The Mediating Role of Interactive Attitudes

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Abstract. Value co-creation behaviors (VCCB) are essential to promote resource integration. However, few studies have explored VCCB in the field of live e-commerce broadcasting. Therefore, this paper distinguishes the live broadcast features from the e-commerce anchor characteristics and agricultural product characteristics to explore their influence mechanisms on customer participation and citizenship behaviors, respectively. Through the questionnaire survey, 353 original data were collected for empirical testing. The results showed that the characteristics of live broadcasts (e-commerce anchor characteristics and agricultural product characteristics) significantly affected the VCCB. Interactive attitudes are an intermediary between live broadcast characteristics and VCCB.

Keywords: E-commerce Anchor Characteristics; Agricultural Product Characteristics; Interactive Attitudes; Customer Value Co-Creation Behaviors; Customer Participation Behaviors; Customer Citizenship Behaviors.

1. Introduction

Rural e-commerce has changed the traditional circulation mode of agricultural products and has become a new engine of online retail of agricultural products. With the change in online retail formats, live delivery of agricultural products has developed rapidly as a new platform economic model. Compared with traditional online retail, the agricultural products live delivery mode provides users with a richer interaction experience, strengthens the connection with anchors and brand merchants, and becomes a value creator. However, there is still a problem at this stage, as the level of product quality control is not high. Therefore, it is necessary to explore how the characteristics of high-quality anchors and agricultural products guide consumers to co-create value.

Presently, research on the factors influencing value co-creation behaviors (VCCB) mainly focuses on the individual, society, and product levels (Jain et al., 2023). The empirical research on value co-creation behavior has focused chiefly on contexts such as tourism and online brand communities, and research on VCCB in the context of live streaming with goods is still minimal, especially when it comes to research on the unique characteristics of live streaming of agricultural products online.

To make up for the shortcomings of existing research, this paper constructs a theoretical model of the mechanism of different live broadcast characteristics on consumer VCCB. Specifically, this paper explores the differentiated effects of e-commerce anchor characteristics and agricultural product characteristics on two kinds of VCCB, namely customer participation behaviors (CPB) and customer citizenship behaviors (CCB), and also studies the possible mediating role of interactive attitudes between live broadcast characteristics and VCCB.

This study makes three contributions. First, we distinguish the live broadcast features of agricultural products from the e-commerce anchor characteristics and the features of agricultural products. This will enrich the study of live broadcast features of agricultural products to a certain extent and avoid the blurring of live broadcast features. Second, by comparing the differences between the characteristics of anchors and the features of agricultural products on CPB and CCB, a more straightforward path is provided to explain the impact of live broadcast characteristics on VCCB. In addition, we explore the possible mediating role of interactive attitudes between live broadcast

characteristics and VCCB and reveal the potential mechanism between live broadcast characteristics and VCCB from a new perspective.

2. Hypothesis and Research Framework

2.1. E-commerce Anchor Characteristics and VCCB

As opinion leaders in e-commerce live broadcasting, anchors' popularity, professionalism, product involvement, and other information source characteristics will directly affect consumers' cognition and behavior (Xu et al.,2021). This kind of cognition and behavior is manifested as CPB and CCB in value co-creation.

In the live broadcast of e-commerce, CPB manifests more as consumers have purchase intentions after the live broadcast and continue to pay attention to the news of anchors or other agricultural products in the live broadcast room. CCB is manifested as consumers' voluntary recommendation, feedback, and tolerance of products or live broadcast rooms. When the anchor can create a lively and relaxed shopping atmosphere, have strong communication skills and real-time interaction with users, and put forward personalized purchase suggestions, it can enhance the user's good impression and deepen the positive impression of the live broadcast experience. They are willing to follow the anchor's news after the live broadcast or continue to browse related agricultural products in the live broadcast room to create value for customer participation. In addition, they are willing to take the initiative to share the agricultural product information they learn through the studio with friends and family and carry out the value creation of customer citizenship. Based on the above analysis, we propose the following hypothesis:

H1. E-commerce anchor characteristics positively influence VCCB.

H1a. E-commerce anchor characteristics positively influence CPB.

H1b. E-commerce anchor characteristics positively influence CCB.

2.2. Agricultural Product Characteristics and VCCB

As a particular type of commodity in live marketing, agricultural products are characterized by permissibility, damage, and affordable prices (Guo et al., 2022), which requires the broadcast room to present the quality, appearance, popularity, and other characteristics of agricultural products as comprehensively as possible.

Therefore, in the live introduction of agricultural products, focus on the detailed description of the content representing the quality information of agricultural products or actively show the actual image of agricultural products to users by providing a real vision to enhance consumers' perception of products and stimulate their purchase intention. This approach helps to realize the value creation of consumer participation behaviors. Existing studies have confirmed that the features of agricultural products have a positive impact on consumers' customer participation behavior. Hughes et al. (1996) found that the quality of fresh agricultural products is still the primary standard that affects consumers' active purchases.

When the brand of agricultural products in the broadcasting room has comprehensive visibility or a high-cost performance, consumers will form a high-quality product awareness and enhance their loyalty to the brand of agricultural products. Specifically, consumers are willing to take the initiative to "like" and "forward" agricultural products in the broadcast room and share positive feedback on the product or service experience. Existing studies have confirmed the positive impact of product features on consumers' CCB. Shao (2011) studied the fact that customers' perceptions of products, prices, and services positively influence their civic behavior, actively recommending the platform's products and services to friends and other customers and helping other customers solve problems during the shopping process. Based on the above analysis, we propose the following hypothesis:

H2. Agricultural product characteristics positively influence VCCB.

H2a. Agricultural product characteristics positively influence CPB.

H2b. Agricultural product characteristics positively influence CCB.

2.3. Interactive Attitudes and VCCB

Interactive attitudes play an essential role in the process of value co-creation. Interactive attitudes are an individual's active participation and response to value co-creation. In this paper, interactive attitudes are defined as the tendency of consumers to enjoy, immerse, and interact with anchors when watching the live broadcast of agricultural products e-commerce. Previous studies have verified the impact of interactive attitudes on the co-creation of agent value. Rather (2021) points out agent attitudes positively impact brand co-value creation. Based on the above analysis, we propose the following hypothesis:

H3. Interactive attitudes positively influence VCCB.

H3a. Interactive attitudes positively influence CPB.

H3b. Interactive attitudes positively influence CCB.

2.4. The Mediating Role of Interactive Attitudes

When the characteristics of anchors and agricultural products are consistent with consumers' expectations, a more positive interactive attitude will be stimulated, promoting customer participation and citizenship behaviors of consumers to a certain extent. When consumers watch the live broadcast, the anchor will interact with consumers efficiently by relying on professional training, practical experience, and other skills. The anchor will present the essential attributes such as color, size, and other attributes of agricultural products in multiple dimensions according to consumers' needs and accept the anchor's feedback on the taste, texture, and usage of agricultural products in the live broadcast, to enhance consumers' perception of the service value of the anchor or agricultural products. Then, the purchase intention of the CPB and the occurrence of CCB, such as active recommendation, will be stimulated. In summary, we believe that interactive attitudes mediate connecting anchor characteristics, agricultural product characteristics, CPB, and citizenship behaviors. In summary, the hypothesis is put forward:

H4. Interactive attitudes have a mediating effect on e-commerce anchor characteristics and VCCB.

H4a. Interactive attitudes have a mediating effect on E-commerce anchor characteristics and CPB.

H4b. Interactive attitudes have a mediating effect on e-commerce anchor characteristics and CCB.

H5. Interactive attitudes have a mediating effect on agricultural product characteristics and VCCB.

H5a. Interactive attitudes have a mediating effect on agricultural product characteristics and CPB.

H5b. Interactive attitudes have a mediating effect on agricultural product characteristics and CCB.

2.5. The Research Framework

Based on the above analysis, this paper constructs the research framework shown in Figure 1. Specifically, we subdivide the live broadcast features into two dimensions, the e-commerce anchor characteristics and the agricultural product characteristics, and study how these features affect the value co-creation behavior of consumers in the live e-commerce context: CPB and citizenship behaviors. At the same time, we investigate the possible mediating role of interactive attitudes in this process to reveal the mediating mechanism of the influence of different characteristics on different types of VCCB.

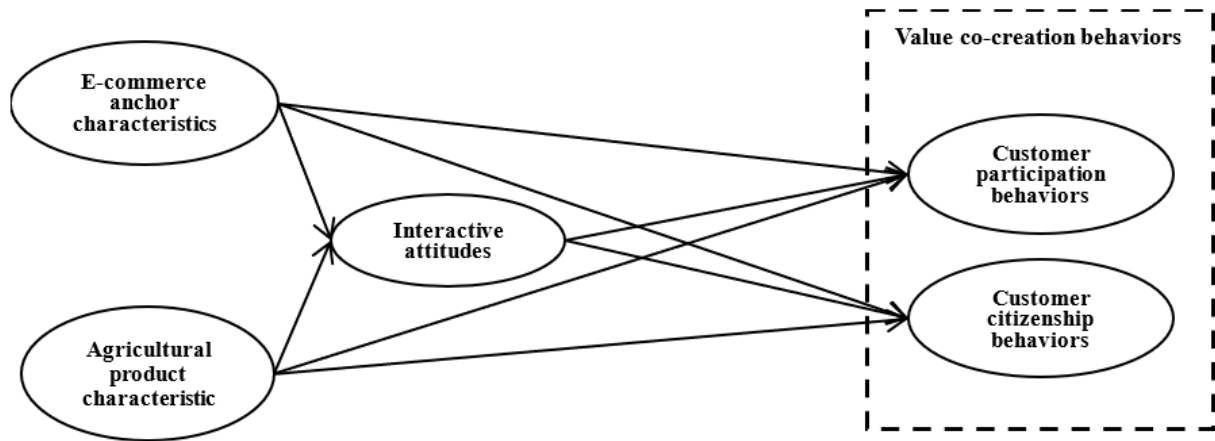


Figure 1. The research framework.

3. Data and Method

3.1. Data Collection and Sample Analysis

We conducted the survey in March 2024. Wenjuanxing was used to design a questionnaire and publish it online. After removing ineligible responses, a total of 353 valid responses were received.

Among these 353 responses, approximately 53.8% were male, and nearly 46.2% were female. Most respondents were 26 to 35, and most had a junior college degree (36.3%) or a bachelor's degree (33.7%). Regarding monthly consumption levels, around 31.7% reported spending below 1,000 yuan, 28.8% between 1,001 yuan and 3,000 yuan, and 32.9% above 5,001 yuan on average.

3.2. Measures

The questionnaire consists of three parts. Most of the construct items were adapted from prior research, and some modifications were made to ensure validity. The measurement items were assessed using a five-point Likert scale. Respondents' emphasis on e-commerce anchor characteristics and agricultural product characteristics was evaluated on a scale ranging from 1 (very unimportant) to 5 (very important). Interactive attitudes, CPB, and CCB were measured on a scale from 1 (strongly disagree) to 5 (strongly agree).

3.3. Analytical Techniques

We constructed a structural equation model (SEM) and utilized the partial least squares (PLS) method for data analysis. Several factors support the choice of PLS-SEM in this study. Firstly, PLS is adept at handling non-normal or ambiguously distributed data (Fornell & Bookstein, 1982). Secondly, PLS-SEM is well-suited for exploring complex models that include mediating or moderating variables (Astrachan et al., 2014). Consequently, PLS-SEM was considered the most appropriate approach for our research framework. The model was tested using Smart PLS version 4.0.

4. Data Analysis and Results

4.1. Common Method Variance

Since the same respondents completed the questionnaire, encountering common method variance (CMV) and threatening scale validity is possible. Employing Haeman's (1967) one-way method for CMV detection, the analysis reveals four factors. Notably, the primary factor explains 48.32% of the total variance, suggesting that CMV does not substantially affect the study's dataset.

4.2. The Measurement Model

Table 1. Reliability and validity tests of the constructs

| Construct | Items | Standard loadings | Cronbach's α | CR | AVE |
|-----------|---|-------------------|---------------------|-------|-------|
| EAC | The e-commerce anchor will popularize produced knowledge and provide buying advice based on the user. | 0.808 | 0.849 | 0.892 | 0.623 |
| | The e-commerce anchor has strong professional ability in the field of agricultural products. | 0.767 | | | |
| | The e-commerce anchor is well known on the live streaming platform. | 0.790 | | | |
| | The e-commerce anchor can quickly, seriously, and actively deal with users' opinions. | 0.775 | | | |
| | The e-commerce anchor's live broadcast room atmosphere is lively and relaxed. | 0.806 | | | |
| APC | The price of this agricultural product is more favorable than offline purchases. | 0.800 | 0.803 | 0.871 | 0.628 |
| | The price of this agricultural product is more favorable than offline purchases. | 0.790 | | | |
| | The live broadcast room will focus on the content that characterizes product quality information. | 0.808 | | | |
| | The appearance of the produce attracted me. | 0.771 | | | |
| IA | I was engaged when I watched the live stream. | 0.830 | 0.847 | 0.897 | 0.686 |
| | I believe the produce I bought was as described by the e-commerce anchor. | 0.817 | | | |
| | When watching the live stream, I followed the e-commerce anchor's interactive instructions to participate in the interactive activities. | 0.829 | | | |
| | It was a pleasure to watch the live stream. | 0.835 | | | |
| CPB | After the live broadcast, I will continue to pay attention to the e-commerce anchor's dynamics. | 0.775 | 0.844 | 0.889 | 0.616 |
| | When I next want to buy produce, I will make my produce picks based on the e-commerce anchor's live streaming dynamics. | 0.803 | | | |
| | After the live broadcast, I will continue to watch the live broadcast of other agricultural products on the platform. | 0.819 | | | |
| | The next time I want to buy agricultural products, I will use the purchase basis based on the live broadcast of agricultural products I have watched. | 0.769 | | | |
| | I am willing to take the initiative to participate in the product experience related to agricultural products. | 0.758 | | | |
| CCB | I am willing to take the initiative to move forward and share the agricultural products in the live broadcast room. | 0.832 | 0.767 | 0.865 | 0.682 |
| | I am willing to take the initiative to introduce other users to the agricultural products I learned about through the live broadcast room. | 0.837 | | | |
| | For problems with agricultural products or services caused by specific reasons, I will choose to forgive. | 0.807 | | | |

Note: CR is short for Composite Reliability; AVE is short for Average Variance Extracted; EAC = E-commerce anchor characteristics; APC = Agricultural product characteristics; IA = Interactive attitudes; CPB = Customer participation behaviors; CCB = Customer citizenship behaviors.

The reliability and validity of the data can be verified through the measurement model. Table 1 presents the results of the structural reliability and validity tests. We indicate that the convergent validity of the model is sufficient since the Average Variance Extracted (AVE) scores exceeded the threshold value of 0.5. Table 1 also displays that all Cronbach's alpha values and CR values were greater than the cutoff value of 0.7, suggesting that the data's reliability is robust (Nunnally, 1978).

This study employed the Fornell-Larcker criterion and HTMT ratio to assess discriminant validity. Table 2 shows that the square root of the AVEs (on diagonal) are all above the inter-construct correlations (the other value in the matrix), indicating that the results have good discriminant validity in the scales. As shown in Table 3, all the values are lower than the cutoff of 0.90, which means the discriminant validity was established (Henseler et al., 2015).

We subjected the data to reliability and validity tests to calculate the distribution of variables. According to the descriptive statistics, the score of e-commerce anchor characteristics (Mean=3.925; S.D.=0.849) is higher than that of agricultural products (Mean=3.893; S.D.=0.871). The score of CCB (Mean=3.881; S.D.=0.940) is higher than that of CPB (Mean=3.858; S.D.=0.852). In addition, the mean of the interactive attitudes is 3.869, and its standard deviation is 0.932.

Table 2. Correlations and square roots of AVEs (Fornell-Larcker criterion).

| | EAC | APC | IA | CPB | CCB |
|-----|--------------|--------------|--------------|--------------|--------------|
| EAC | 0.789 | | | | |
| APC | 0.720 | 0.793 | | | |
| IA | 0.757 | 0.738 | 0.828 | | |
| CPB | 0.723 | 0.728 | 0.746 | 0.785 | |
| CCB | 0.672 | 0.695 | 0.678 | 0.712 | 0.826 |

Note: EAC=E-commerce anchor characteristics; APC=Agricultural product characteristics; IA=Interaction attitudes; CPB=Customer participation behaviors; CCB=Customer citizenship behaviors.

Table 3. Heterotrait-Monotrait Ratio (HTMT) and confidence interval

| | EAC | APC | IA | CPB |
|-----|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| APC | 0.869 [0.804,0.928] | | | |
| IA | 0.890 [0.828,0.945] | 0.893 [0.825,0.953] | | |
| CPB | 0.853 [0.787,0.912] | 0.884 [0.810,0.947] | 0.882 [0.825,0.931] | |
| CCB | 0.829 [0.761,0.890] | 0.882 [0.810,0.946] | 0.837 [0.759,0.906] | 0.884 [0.813,0.946] |

Note: The diagonal (bold) elements are the square roots of AVEs, the off-diagonal elements are the correlations among constructs, and the confidence interval of the value is in parentheses. EAC = E-commerce anchor characteristics; APC = Agricultural product characteristics; IA = Interactive attitudes; CPB = Customer participation behaviors; CCB = Customer citizenship behaviors.

4.3. Path Relationship Evaluations

Using the PLS-SEM algorithm, we evaluated the structural model and determined the coefficient significance through bootstrapping resampling (5,000 resamples).

The results of hypothesis testing and structural relationships are displayed in Table 4. The results show that e-commerce anchor characteristics ($\beta = 0.259, p < 0.001$) and agricultural product characteristics ($\beta = 0.297, p < 0.001$) significantly positively influence CPB; H1a and H2a are supported. Furthermore, e-commerce anchor characteristics ($\beta = 0.242, p < 0.001$) and agricultural product characteristics ($\beta = 0.341, p < 0.001$) significantly positively influence CCB; H1b and H2b are supported. Moreover, e-commerce anchor characteristics ($\beta = 0.468, p < 0.001$) and agricultural product characteristics ($\beta = 0.401, p < 0.001$) significantly positively influence interactive attitudes. As anticipated, the results of the interactive attitudes ($\beta = 0.331, p < 0.001$) have a significant positive effect on CPB, and the interactive attitude ($\beta = 0.243, p < 0.001$) significantly positively influence CCB; H3a and H3b are supported.

The structural model results are depicted in Figure 2. R^2 values exceeding 0.55 for all endogenous variables suggest a substantial effect size (Cohen, 1992). Then, the Stone-Geisser-Criterion (Q^2) was assessed. The Q^2 value of CCB is the smallest, which is 0.376, indicating conformity with standard predictive correlation criteria for the PLS-SEM model.

Table 4. Results of algorithm and bootstrapping tests.

| Hypothesis | β | T-value | p-value |
|------------|----------|---------|---------|
| EAC->IA | 0.468*** | 9.275 | 0.000 |
| EAC->CPB | 0.259*** | 4.850 | 0.000 |
| EAC->CCB | 0.242*** | 4.054 | 0.000 |
| APC->IA | 0.401*** | 7.581 | 0.000 |
| APC->CPB | 0.297*** | 5.247 | 0.000 |
| APC->CCB | 0.341*** | 5.833 | 0.000 |
| IA->CPB | 0.331*** | 5.656 | 0.000 |
| IA->CCB | 0.243*** | 3.551 | 0.000 |

Note: EAC = E-commerce anchor characteristics; APC = Agricultural product characteristics; IA= Interactive attitudes; CPB = Customer participation behaviors; CCB = Customer citizenship behaviors. *** $p < 0.001$.

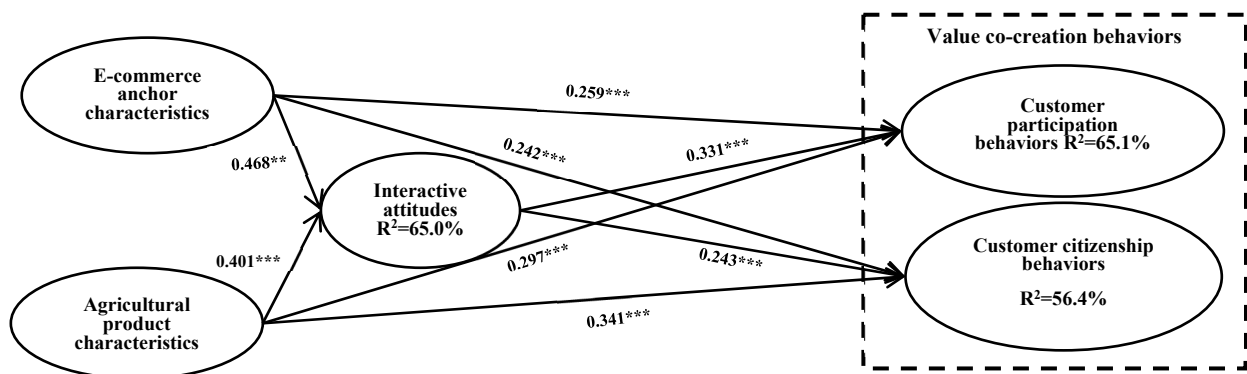


Figure 2. Results of the structural model.

4.4. Mediating Effect Analysis

We applied the bootstrapping method to test the mediating effects. Table 5 summarizes the specific indirect, direct, and total effects between two characteristics of live-streaming and value co-creation behavior. We conclude that the interactive attitudes are a significant mediator of the CCB and CPB as all the 95% confidence intervals did not include zero and t-value > 1.96.

Table 5. The results of mediating effect analysis.

| Hypothesis and paths | Specific indirect effects | | | Direct effects | | | Total effects | | |
|----------------------|---------------------------|---------|----------------------|----------------|---------|----------------------|---------------|---------|----------------------|
| | β | T-value | Confidence intervals | β | T-value | Confidence intervals | β | T-value | Confidence intervals |
| EAC->IA->CPB | 0.155*** | 4.849 | [0.095,0.220] | 0.259*** | 4.850 | [0.158,0.366] | 0.414*** | 8.366 | [0.317,0.510] |
| EAC->IA->CCB | 0.114*** | 3.424 | [0.046,0.176] | 0.242*** | 4.054 | [0.128,0.365] | 0.356*** | 6.733 | [0.251,0.459] |
| APC->IA->CPB | 0.133*** | 4.566 | [0.078,0.192] | 0.297*** | 5.247 | [0.187,0.408] | 0.430*** | 7.928 | [0.321,0.530] |
| APC->IA->CCB | 0.098*** | 3.136 | [0.037,0.159] | 0.341*** | 5.833 | [0.224,0.457] | 0.439*** | 8.255 | [0.330,0.542] |

Note: EAC = E-commerce anchor characteristics; APC = Agricultural product characteristics; IA = Interactive attitudes; CPB = Customer participation behaviors; CCB = Customer citizenship behaviors. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

5. Discussion

This study aims to explore the impact of live-streaming characteristics on value co-creation behavior. The main findings of the study are explored as follows.

First, the characteristics of live broadcasting (characteristics of anchors and features of agricultural products) positively impact consumers' value co-creation behavior. Among them, the influence of agricultural product characteristics on value co-creation behavior is greater than that of anchor characteristics, which indicates that the characteristics of agricultural products have a more significant impact on stimulating consumers' value co-creation behavior. The characteristics of agricultural products, such as quality and taste, directly constitute the core of consumers' actual consumption and experience, so product quality and characteristics are still one of the most critical factors for consumers to consider when purchasing products. In contrast, although the popularity and professionalism of anchors can actively improve consumers' perception of products, their influence is more limited to entertainment and information, which is not directly related to consumers' interests, like the features of agricultural products.

Second, interactive attitudes significantly mediate between live broadcast characteristics and value co-creation behavior. The anchor introduces the product features in detail in a live broadcast through professional and witty expressions. Subsequently, consumers communicate and interact with the anchor in real-time through the bullet screen, enhancing consumers' intuitive perception of the product. At the same time, in this process, key features such as the price and appearance of agricultural products are effectively conveyed to consumers through anchors, thus enriching their abstract cognition of the quality characteristics of agricultural products. Through this active two-way interaction between consumers and anchors, consumers can establish a partnership with anchors in an immersive manner, enhance their purchase intention and actively participate in VCCB such as "like" and "forward". Therefore, interactive attitudes are crucial in live broadcast characteristics affecting consumer value co-creation behavior.

Finally, the mediating effect of interactive attitudes on the characteristics of live broadcasting on CPB is more significant than on CCB. The possible reason is that the difficulty of stimulating the two kinds of different VCCB is different, and the difficulty of stimulating the CPB is significantly less than that

of CCB. Specifically, when anchors give emotional value to consumers during the interaction, it enhances their willingness to buy products. However, because consumers still lack a real experience with the product, they may feel uncertain when considering recommending the product to family or friends, inhibiting their recommendation behavior and thus reinforcing the incentive barrier to consumer citizenship behaviors.

6. Conclusion, Implications, and Limitations

6.1. Conclusion

Based on the research results of this paper, we draw the following conclusions. First, live broadcast features have a significant positive impact on stimulating consumers' VCCB, among which the features of agricultural products have the most decisive impact on promoting consumers' value co-creation behavior. Second, interactive attitudes are an intermediary between live broadcast characteristics and VCCB. Finally, the mediating effect of interactive attitudes on the influence of live broadcast features on CPB is more potent than its mediating effect on CCB.

6.2. Implications

This study has specific practical significance for e-commerce live marketing to promote the value co-creation behavior of Chinese consumers.

First of all, given the positive impact of live broadcast characteristics on value co-creation behavior, it is necessary to give full play to the professionalism and interaction of anchors to stimulate consumers' VCCB. Specifically, anchors can export value by telling touching stories behind the production process of agricultural products and mobilizing consumers' emotional input. In addition, anchors should regularly conduct professional and systematic training to respond to users' accurate needs in real-time broadcasts and further promote the occurrence of VCCB.

Secondly, the influence of the characteristics of agricultural products on the VCCB of consumers should not be ignored. The appearance, quality, price, and brand of agricultural products should be fully displayed during the live broadcast. For example, the broadcast room will be set up in the first-line places of agricultural product-producing areas. The appearance of agricultural products can also be presented in an all-around and multi-angle manner with the help of digital technologies such as VR and AR.

Finally, because of the positive and significant mediating effect of interactive attitudes on VCCB, good interactive attitudes of consumers should be shaped in the live broadcasting process. Among them, active interaction of red envelopes and gift vouchers and heated discussion of consumer connection are practical measures to enhance consumers' interactive attitudes.

6.3. Limitations

The limitations of this paper are mainly reflected in the following three points. Firstly, convenience sampling rather than random sampling was used in this study. This can lead to sample selection bias, which limits the general applicability of the findings. Second, our sample selection is limited to China and may not be fully applicable to consumer behavior in other countries. China has a unique food culture and consumption habits, which is different from the situation in other countries. Third, because this study used cross-sectional data, we cannot establish a causal relationship between variables.

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