# Investigation and Study on the Role of Digital Marketing in Promoting Rural Specialty Agricultural Products

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**Abstract.** With the continuous development of science and technology, the digital economy is booming and the construction of digital villages is accelerating. Among them, the "Internet Plus" model has played an important role in promoting agricultural products from the countryside to the city and boosting farmers' income. Through the promotion of the Internet platform, more and more consumers have begun to understand and buy special agricultural products in the countryside, thus broadening the sales channels of agricultural products and driving the growth of farmers' income. According to statistics, in 2022, the online retail sales of agricultural products in China reached 422.1 billion yuan, a figure that fully proves the great potential of digital marketing in the sale of agricultural products. Therefore, this study will focus on the digital marketing of agricultural products, aiming to deeply analyse the impact of various factors on the promotion effect. For example, how to choose a suitable online platform, how to develop an effective marketing strategy, and how to improve the quality of agricultural products. Through these analyses, we will provide relevant suggestions for rural marketing and help farmers make better use of digital marketing tools to enhance the sales effect of agricultural products and further promote the development of rural economy.

**Keywords:** Digital marketing; Cluster analysis; Structural equation model; Mediation effect.

## 1 Introduction

### 1.1 Background

In the era of flourishing digital economy, the construction of digital rural areas has accelerated, promoting livable and prosperous rural communities. The long-standing issue of communication difficulties in rural areas has been historically resolved. Digitalization has facilitated strong governance and improved rural information services, with a cumulative

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construction and operation of 467,000 beneficial information facilities, serving a total of 980 million people. The integration of "Internet Plus" with agricultural products has contributed to increased income for farmers, with the national online retail sales of agricultural products reaching 422.1 billion yuan in 2021.

### 1.2 Literature Review

Regarding the research on digital marketing, Klingenberg (2022)[1] explored the impact of digitization on value creation through four dimensions of the value chain: activities, flows, actors, and governance. The study concluded that value creation is increasingly happening outside industry boundaries through platforms operated by large enterprises. Wang Mingjie (2022)[2] investigated the spatial pattern and evolutionary characteristics of e-commerce specialty villages and found a high level of spatial distribution consistency between Taobao villages and China's basic geographic pattern. Yao Xi and Qin Xuebing (2013) proposed that with the normalization of virtual existence, digital marketing will become the primary form of marketing in the era of virtual existence, and the interaction and integration between digital marketing and traditional marketing will coexist in the long term. Yao Xi and Han Wenjing (2015) suggested that interaction is the basis for measuring the effectiveness of digital marketing communication. Consumers of digital media have a strong sense of participation and active speaking rights, and consumer participation is the key to achieving effective digital marketing communication in an interactive logic.

In the research on agricultural product marketing, Guo Jinyang (2007) proposed that compared to choosing transportation agents, agricultural producers with high production concentration, large price fluctuations, and difficult sales are more willing to choose industrial and commercial enterprises, cooperative organizations or associations, and professional wholesale markets. Cha Jinxiang and Li Dongsheng (2006)[3] provided a preliminary framework for agricultural product online marketing based on the strategic importance and obstacles of current agricultural product online marketing, focusing on supporting systems, application systems, guarantee systems, and supporting measures. In the field of rural e-commerce, Qin Fang and Wang Jiancheng (2022)[4] found that the development of rural e-commerce significantly improves rural household income. Furthermore, e-commerce development enhances entrepreneurial capabilities, increases non-agricultural employment, and increases the probability of land transfer. Wang Ruifeng (2021)[5] discovered that rural e-commerce exhibits nine dynamic characteristics: model diversity, social functionality, consumer specificity, economic development imbalance, weak competition, weak foundation, resource integration, government support, and incremental innovation. These nine characteristics can be further classified into five dimensions: platform, consumer, region, foundation, and innovation. Li Zhiping and Wu Fanfu (2021)[6] found that rural e-commerce has a direct poverty reduction effect, generates indirect poverty reduction effects through rural revitalization, and the prosperity of industries and rural governance has a positive effect on indirect poverty reduction. However, their effects on aspects such as rural cultural norms, ecological livability, and material abundance are not significant or even negative. Chen Weiping and Li Yan (2022)[7] found that the number of consumers has a significantly positive impact on the sales performance of rural e-commerce.

Although there is a diverse range of research on digital commerce and rural revitalization, most of the studies conducted by scholars focus on the sociological aspects and establish marketing

models by integrating theories from advertising and communication. There is a relatively limited number of studies that quantitatively analyze the influencing factors of digital commerce in rural revitalization. This study aims to address this research gap by conducting a statistical analysis to further investigate the factors affecting digital commerce in rural revitalization.

### 1.3 Research Methodology

This study is based on the extraction of comments from an online platform for agricultural product sales, followed by mining and summarizing the topics using Latent Dirichlet Allocation (LDA). Based on seven characteristic factors, including consumer preferences and actions, the study aims to identify the significant factors affecting consumers' willingness to purchase agricultural products, including factors related to agricultural product brands and sales channels. Through LDA analysis, literature review, and field visits, the factors influencing consumers, farmers, and consumer-related intermediaries are categorized into four, four, and two mediating variables, respectively. A structural equation model (SEM) is then constructed to integrate the theoretical model of digital marketing promoting the "breakthrough" of agricultural products in mountainous areas.

## 2 Theoretical Analysis

### 2.1 The three key players in the success of rural agricultural products through digital marketing

(1) Farmers: In China, over 98% of agricultural entities engaged in the production and sale of distinctive agricultural products are small-scale farmers. Small-scale farming remains the fundamental aspect and primary form of agricultural operation in China. Therefore, among the three key players in digital marketing facilitating the success of rural agricultural products, the focus is on small-scale farmers, who constitute a significant proportion of agricultural entities[8].

(2) Supporters: Supporters consist of government officials and party members. Upon receiving applications from farmers, they thoroughly investigate and verify the situation of unsold agricultural products. Once verified, they publish information about the unsold products on platforms such as China Agricultural Network, China Xinghuo Network, and China Rural Forum, helping farmers find sales channels and overcome the challenges of unsold products.

(3) Consumers: Consumers of agricultural products refer to the individuals who have the willingness and ability to purchase agricultural products during a specific period. The concept of consumer demand for agricultural products encompasses three essential conditions: the existence of a sufficient consumer base, consumer desire to make purchases, and consumer affordability under existing price conditions.

The four stages of this process are illustrated in Figure 1.

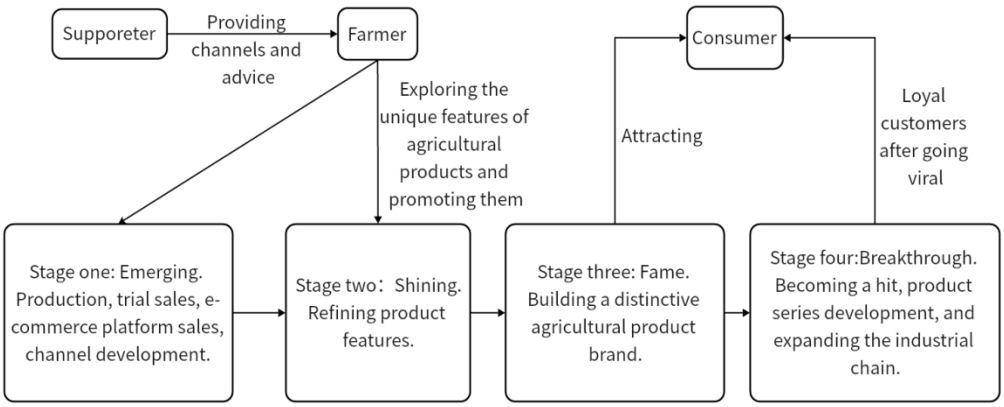



**Fig. 1.** Three Entities and Four Stages Framework for Digitally Marketing Rural Agricultural Products to Go Beyond the Local Market

## 2.2 Factors Influencing the Promotion of Mountainous Agricultural Products through Digital Marketing

Analysis of factors influencing the promotion of mountainous agricultural products through digital marketing primarily utilizes data mining, code clustering, and text analysis[9].

The extraction of topic keywords and topic induction is achieved using the Latent Dirichlet Allocation (LDA) topic model. Firstly, consumer comments related to agricultural product marketing are collected by web scraping from popular online shopping platforms and social media platforms such as Taobao, Douyin, and Weibo. The LDA topic model is then applied to model the text of these comments, mining the topic keywords and their frequencies.

Based on the analysis, when the number of topics is set to 19, it satisfies the criteria of low perplexity and high coherence. Therefore, 19 is chosen as the number of topics for the LDA topic modeling. Building upon this, in-depth mining and analysis of the hot topics in people's comments on the agricultural product marketing platforms were conducted.

The trained LDA topic model was utilized to extract the topics from people's comments on the agricultural product marketing platforms. This process generated a "topic-word" matrix, and the characteristic words for each topic were computed. The resulting topic keywords are presented in Table 1.

**Table 1.** LDA Modeling Topic Keywords

| Topic | Words |
|---|---|
| Topic 1 | Fresh, First time, Life Happiness, Three kilograms, Farmer, County mayor, Appearance, Longing for Gratitude |
| Topic 2 | Boss, Finally, Product, Want, First, Casual, Planting, Link, Double yellow, Out-of-town |
| Topic 3 | Delicious, Potato, Especially, Texture, Fresh, Really, Excellent, Like, Tasty, Qingwang |
| ... | ... |

| | |
|---|---|
| Topic 18 | Not bad, Fragrance, Place an order, Not good, Grounded, Smell, Ah, family, Don't want, Can only |
| Topic 19 | Kangzi, Recommend, Cheap, Authorized seller, Branded, Delicious food, Success, Not okay, Bad-tasting, In history. |

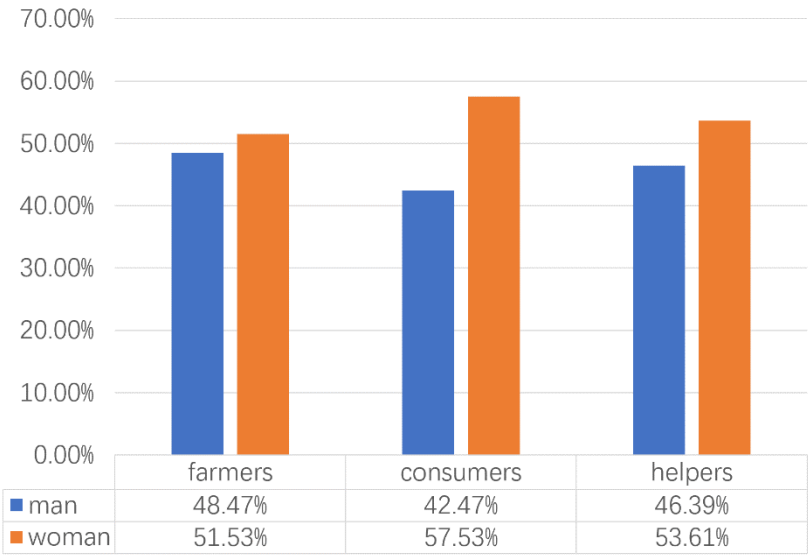
According to the experimental results, consumer attention to the topics covered in agricultural product information on marketing platforms shows a wide range and diversity. Using this method, similar topics are grouped together, and the final topics 1 to 19 are categorized as digital marketing, consumer word-of-mouth, consumer philanthropy awareness, consumer value perception, consumer information perception, and consumer purchase intention.

Regarding farmers and consumers, offline interviews were conducted. Through these interviews, factors were identified and ultimately classified for farmers and consumers as farmer information perception, farmer responsibility awareness, supporter responsibility awareness, and supporter assistance methods.

The factors extracted in this study mainly have two sources: first, the factors influencing the "breakthrough" of rural agricultural products with the assistance of digital marketing were derived from the analysis of comments on online platforms for agricultural product sales and the application of Latent Dirichlet Allocation (LDA)[10] to extract relevant topics, combined with previous studies. Second, variables were extracted from existing relevant literature.

Finally, this research team combined in-depth interviews and relevant literature[11] to construct conceptual models for consumers, farmers, and supporters, respectively. For consumers, four factors influencing the effectiveness of digital marketing were identified as antecedent variables: consumer value perception, consumer information perception, consumer risk perception, and consumer purchase intention. The intermediate variables were consumer purchase intention, and the outcome variable was consumer purchase behavior. For farmers, the antecedent variable was the sense of responsibility of supporters, and the intermediate variables were digital marketing, farmer information perception, farmer responsibility perception, and product and service quality. The outcome variables were purchase intention and consumer value perception. The conceptual model for consumers focused on three factors influencing the effectiveness of digital marketing as antecedent variables: consumer value perception, consumer information perception, and consumer risk perception. The intermediate variables were digital marketing and consumer information perception, and the outcome variable was consumer risk perception. Finally, all the conceptual models were combined to form an overall conceptual model.

The factors obtained through LDA were used to design the questionnaire, from which descriptive statistics were derived. The percentage of men and women among the respondents is shown in Figure 2. The age distribution of medium farmers, consumers and consumers are shown in Figures 3, 4 and 5 respectively.




| | farmers | consumers | helpers |
|---|---|---|---|
| man | 48.47% | 42.47% | 46.39% |
| woman | 51.53% | 57.53% | 53.61% |

**Fig. 2.** Gender ratio of respondents

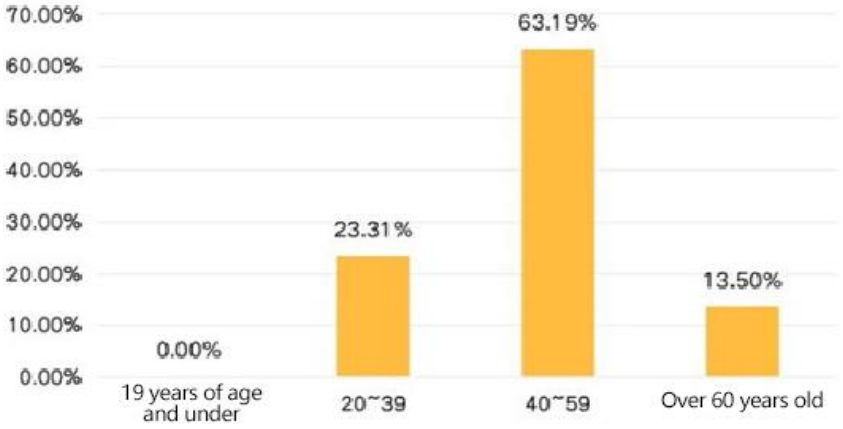



**Fig. 3.** Age distribution of farmers

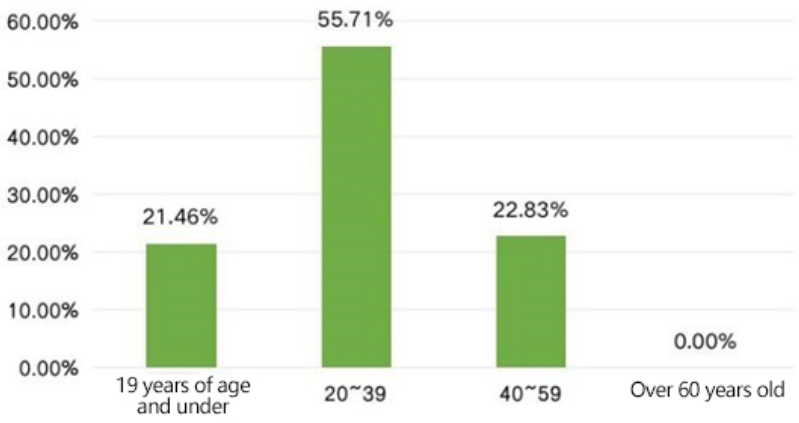



**Fig. 4.** Consumer age distribution

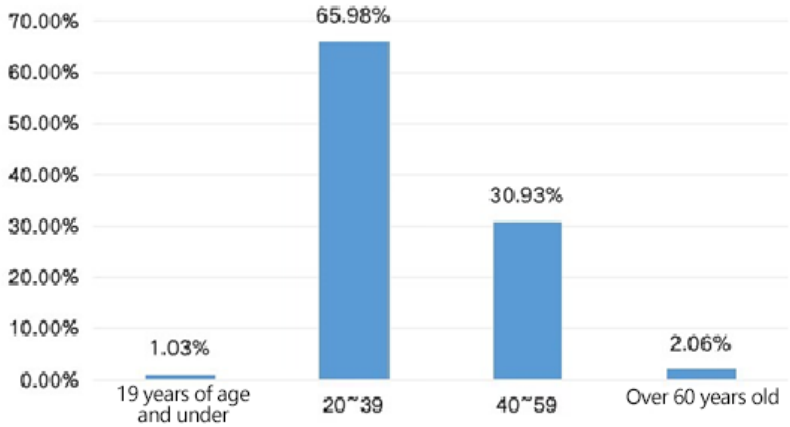



**Fig. 5.** Age distribution of supporters

## 3 Model Specification

The constructed structural equation models for farmers, consumers, supporters, and the overall integrated model are shown in Figures 6 to 9, respectively.

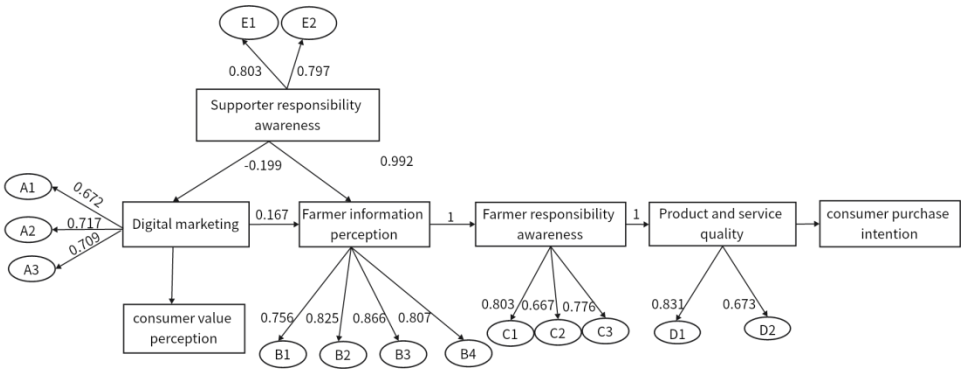



**Fig. 6.** Structural Equation Model for Farmers Based on Questionnaire Statistics

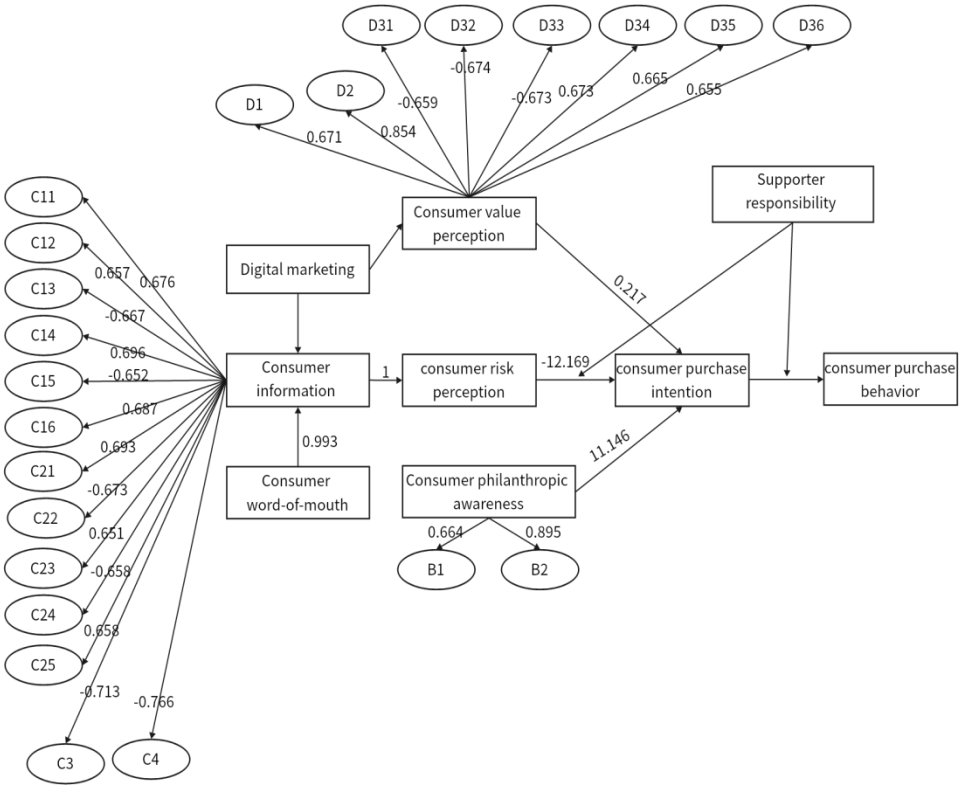



**Fig. 7.** Structural Equation Model for Consumers Based on Questionnaire Statistics

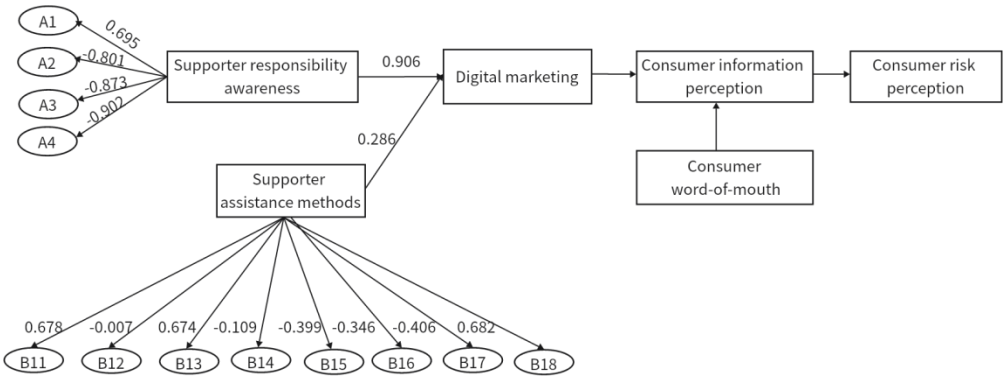



**Fig. 8.** Structural Equation Model for Supporters Based on Questionnaire Statistics

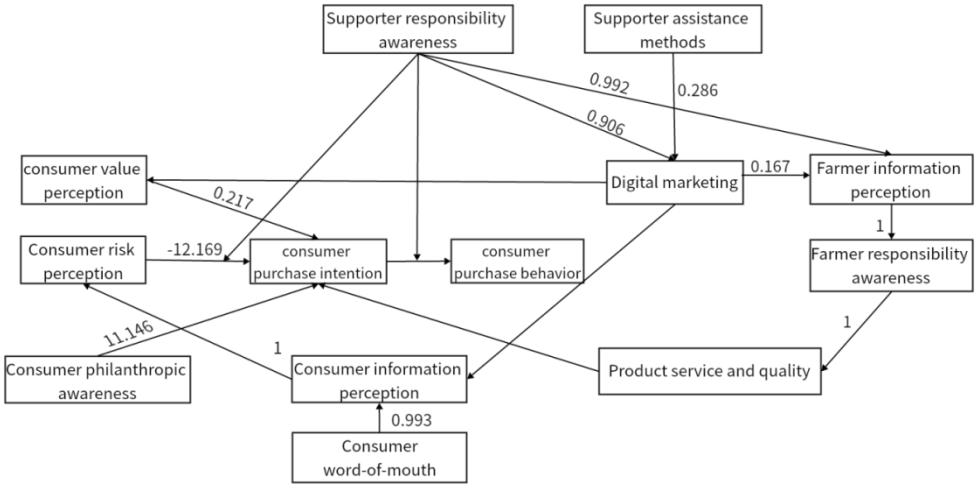



**Fig. 9.** Overall Structural Equation Model Based on Questionnaire Statistics

### 3.1 Model hypothesis testing and result analysis

Through SPSS fitting test and path analysis of the entire model data, the hypothesis test results are as follows:

**(1) Results of the farmer structural equation model**

The fitting test of the farmer structural equation model is shown in Table 2.

**Table 2.** Fitting test and path analysis of the structural equation model for farmers

| Factor (Latent Variable)→ Analysis items ( observed variable ) | Unstandardized Coefficients | Standardized Coefficients | S.D. | Z | P |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Digital Marketing → Perception of Farmer Information | 0.599 | 0.167 | 0.258 | 2.322 | 0.020** |
| Supporter's sense of responsibility → Perception of Farmer Information | 0.981 | 0.992 | 0.106 | 9.285 | 0.000*** |
| Perception of Farmer Information → Farmers' sense of responsibility | 1.135 | 1 | 0.106 | 10.743 | 0.000*** |
| Farmers' sense of responsibility→ Product service and quality | 0.97 | 1 | 0.079 | 12.299 | 0.000*** |
| Supporter's sense of responsibility → Digital Marketing | -0.055 | -0.199 | 0.032 | -1.736 | 0.082* |

Note: ***p, **p, and *p represent significance levels of 1%, 5%, and 10%, respectively

Perform path analysis on the structural equation model of farmers, based on the paired item of digital marketing → farmer information perception, with a significance P-value of 0.020**. If there is significance at the horizontal level, reject the null hypothesis. Therefore, this path is effective with an impact coefficient of 0.167; Based on the paired item supporter's sense of responsibility → farmer information perception, the significance P-value is 0.000**, which shows significance at the horizontal level. Therefore, the null hypothesis is rejected, and the path is effective with an impact coefficient of 0.992; Based on the paired item of farmer's information perception → farmer's sense of responsibility, the significance P-value is 0.000**, which is significant at the horizontal level. Therefore, the null hypothesis is rejected, and the path is effective with an impact coefficient of 1.0; Based on the paired item of farmers' sense of responsibility → product service and quality, the significance P-value is 0.000**, which shows significance at the horizontal level. Therefore, the null hypothesis is rejected, and the path is valid with an impact coefficient of 1.0.

Based on the paired item supporter's sense of responsibility → digital marketing, the significance P-value is 0.082*, and there is no significance at the level. Therefore, the null hypothesis cannot be rejected, and this path is invalid.

**(2) Consumer Structural Equation Model Results**

The fitting test of the consumer structural equation model is shown in Table 3.

**Table 3.** Consumer Structural Equation Model Fitting Test and Path Analysis

| Factor (Latent Variable)→ Analysis items (observed variable) | Unstandardized Coefficients | Standardized Coefficients | S.D. | Z | P |
|---|---|---|---|---|---|
| Consumer information perception → | 107.501 | 1 | 0.02 | 5249.411 | 0.000*** |

| | | | | | |
|---|---|---|---|---|---|
| Consumer risk perception | | | | | |
| Consumer risk perception → purchase intention | -12.79 | -12.169 | 0.311 | -41.148 | 0.000*** |
| Consumer awareness of love → purchase intention | 173.971 | 11.146 | 0.021 | 8473.649 | 0.000*** |
| Consumer value perception → purchase intention | 0.323 | 0.217 | 0.223 | 1.451 | 0.147 |
| Consumer word-of-mouth → Consumer information perception | 0.014 | 0.993 | 0.001 | 10.036 | 0.000*** |

Note: ***, **, * represent significance levels of 1%, 5%, and 10%, respectively

Perform path analysis on the consumer structural equation model, based on the paired item of consumer information perception → consumer risk perception, with a significance P-value of 0.000**. If there is significance at the horizontal level, reject the null hypothesis, and therefore this path is valid with an impact coefficient of 1.0; Based on the paired item of consumer risk perception → purchase intention, the significance P-value is 0.000***, indicating significance at the horizontal level. Therefore, the null hypothesis is rejected, and the path is valid with an impact coefficient of -12.169; Based on the paired item of consumer love awareness → purchase intention, the significance P-value is 0.000***, which is significant at the horizontal level. Therefore, the null hypothesis is rejected, and the path is valid with an impact coefficient of 11.146; Based on the paired item of consumer value perception → purchase intention, with a significance P-value of 0.147, if there is no significant level, the null hypothesis cannot be rejected, therefore this path is invalid; Based on the paired item of consumer word-of-mouth → consumer information perception, the significance P-value is 0.000**, indicating significance at the horizontal level. Therefore, the null hypothesis is rejected, and the path is valid with an impact coefficient of 0.993.

**(3) Supporter Structural Equation Model Results**

The fitting test of the support structural equation model is shown in Table 4.

**Table 4.** Fitting Test and Path Analysis of Supporter Farmer Structure Equation Model

| Factor (Latent Variable)→ Analysis items ( observed variable ) | Unstandardized Coefficients | Standardized Coefficients | S.D. | Z | P |
|---|---|---|---|---|---|
| Supporter's sense of responsibility → Digital marketing | 482.259 | 0.906 | 0 | 40079578.77 | 0.000*** |
| Supporter Assistance Methods → Digital Marketing | 195.58 | 0.286 | 0 | 10966077.35 | 0.000*** |

Note: ***, **, * represent significance levels of 1%, 5%, and 10%, respectively

Perform a path analysis on the consumer structural equation model, based on the paired item supporter's sense of responsibility → digital marketing, with a significance P-value of 0.000***, indicating significance at the horizontal level. Therefore, reject the null hypothesis, and the path is effective with an impact coefficient of -0.906. Based on the paired item support method → digital marketing, the significance P-value is 0.000***, which shows significance at the horizontal level. Therefore, the null hypothesis is rejected, and the path is effective with an impact coefficient of -0.286.

## 4 Recommendations and Conclusion

To leverage digital marketing effectively in promoting agricultural products in mountainous areas and broaden their reach, the following development recommendations can be proposed:

Enhance infrastructure for digital marketing: The government should increase investment in network infrastructure in mountainous regions, improving network coverage and signal stability to provide a better foundation for digital marketing.

Expand the scope of digital marketing channels: In digital marketing, it is recommended to explore and utilize various channels such as social media, short videos, live streaming, etc., to vividly showcase the brand image and unique features of mountainous agricultural products, attracting a wider range of consumers.

Emphasize personalized digital marketing strategies: Given the diverse range of mountainous agricultural products and varying consumer demands, it is essential to develop personalized digital marketing strategies based on specific products and consumer needs to enhance the effectiveness of digital marketing.

Strengthen the integration of digital marketing with logistics and distribution: Digital marketing and logistics are interconnected. It is crucial to establish efficient agricultural product supply chains by integrating digital marketing with logistics and distribution, thereby improving delivery efficiency and customer satisfaction.

Enhance support for stakeholders: The government can provide increased support for digital marketing by offering financial assistance, technological support, and talent development. This helps rural agricultural products undergo digital transformation. Furthermore, efforts can be made to enhance branding and promotion for rural agricultural products, increasing their influence and visibility. Social organizations can organize agricultural product fairs, specialized agricultural product festivals, and other activities to boost sales and market share. Additionally, e-commerce platforms can provide free store setup, promotional resources, logistics, payment settlement, and after-sales services to assist rural agricultural products in digital marketing and improve their online sales capabilities and effectiveness.

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