



# Research on the Path of E-Commerce Empowering Rural Revitalization: An Empirical Analysis Based on the Development of Walnut Industry in Cao Fan County, Jinan City, Shandong Province

Hanqi Fu\*

Business English Major, School of Foreign Languages, Qilu Normal University, Jinan, China

Email: \*2587723973@qq.com

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## Abstract

In the context of the Rural Revitalization Strategy, rural e-commerce has become an important engine for activating the rural economy and thus directly affects farmers' income and industrial competitiveness. The "Caofan Walnut" from Zhangqiu, Shandong, as a representative of characteristic agricultural products in North China, has an annual output of over 5 million pounds. However, its online sales account for less than 10%, which is far below the national average level of rural e-commerce income growth (15%), revealing the key challenges in the digital transformation of traditional agriculture. This study conducted questionnaires among 120 walnut growers, 15 cooperatives, and 8 e-commerce enterprises in the Caofan walnut industry, using multiple regression analysis and case-comparison methods to identify and address the bottlenecks in the development of e-commerce. The study identified four major challenges in the development of Caofan walnut e-commerce: a logistics loss rate of 25% due to weak infrastructure, a brand-value premium rate of less than 10% due to a lack of brand value, insufficient operational capacity with only 20% local teams, and inadequate quality control with a quality fluctuation rate of 35%. To address these problems, this paper proposes a three-pronged solution: In the short term, it is necessary to optimize the cold-chain logistics network and build regional distribution centers. In the medium term, it is necessary to rely on short-video platforms to conduct "walnut culture" themed live broadcasts and create a regional public brand for "Zhangqiu Walnut." In the long term, it is necessary to build a full-industry-chain quality system and cultivate local teams through e-commerce talent incubation bases. Pilot data in-

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dicating that this model can increase quarterly sales volume by 65%, providing theoretical and practical references for similar regions. This study offers a systematic solution for Caofan walnuts to enhance market competitiveness and increase farmers' income and also provides practical references for other regions to develop characteristic agricultural product e-commerce and promote rural revitalization.

## Subject Areas

Development of Characteristic Agriculture

## Keywords

Rural Revitalization, Rural E-commerce, Caofan Walnut, E-Commerce Development Bottlenecks, Solutions

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## 1. Introduction

Driven by the Rural Revitalization Strategy, rural e-commerce has become a key force in activating the rural economy [1]. The "Caofan Walnut" from Zhangqiu, Shandong, as a characteristic agricultural product, has an annual output of over 5 million pounds. However, its online sales account for less than 10%. The slow income growth of farmers shows a significant gap compared with the national average level of 15% income growth for farmers driven by rural e-commerce, which highlights the urgency of transforming traditional sales models [2].

This study combines field research with case analysis to conduct a multi-dimensional diagnosis of the Caofan Walnut industry. It aims to explore effective paths for rural revitalization by analyzing the current status and problems of its e-commerce development [3]. The research uses stratified sampling and conducts surveys and in-depth interviews with growers, cooperatives, and e-commerce enterprises, combining e-commerce platform sales data to systematically identify the bottlenecks and potential opportunities in the development of e-commerce through a combination of quantitative and qualitative research methods.

Based on the research and case analysis, it is found that although the e-commerce of Caofan Walnut has initially formed an industrial basis, it still faces many bottlenecks. (1) Weak infrastructure: The logistics system is not perfect, and the low coverage rate of cold chains leads to serious transportation losses [4]. (2) Lack of brand value: Insufficient exploration of local culture and low consumer awareness. (3) Shortage of professional talent: Insufficient e-commerce operation capabilities and lagging construction of local teams. (4) Low degree of standardization: The grading and screening system for products is not sound, and the stability of product quality is poor.

To address these issues, the report proposes strengthening the construction of logistics and network facilities, creating local cultural brands, building a local e-commerce talent system, and improving quality standards and regulatory mecha-

nisms. It puts forward an integrated solution of “logistics upgrade + cultural empowerment + talent cultivation” and forms a blended model of “online live streaming for traffic attraction + offline experiential consumption.” [5] Additionally, it suggests that the strategy should be implemented through policy support, multi-party cooperation, and phased implementation. The research results can provide solutions for Caofan Walnut to enhance market competitiveness and increase farmers’ income and offer practical references for other regions to develop e-commerce for characteristic agricultural products and promote rural revitalization.

## 2. Background

### 1) Long-standing history and strong representativeness

The Caofan Thin - shelled Walnut Base has won the titles of “Top Ten Forestry and Fruit Production Bases in Jinan”, “Experimental Demonstration Base of the Nut Branch of the Chinese Society of Horticultural Science”, and “National Thin - shelled Walnut Construction Base”. The walnuts are large in size, thin - shelled, with white kernels, fragrant taste, and high kernel ratio. They are China’s national geographical indication products. They are convenient to eat without the need for any tools; you can simply pinch them open with your hands. Moreover, they are highly nutritious. Daily consumption can supplement fats, proteins, and various trace elements such as calcium and iron. However, local growers have failed to successfully promote walnuts to achieve prosperity.

### 2) The contradiction between production and marketing that increases production without increasing income

The walnut planting area of Caofan Town, Zhangqiu is 3000 mu, with an annual output of more than 5 million catties, but the average annual income growth rate of farmers under the traditional sales model is only 3% - 5%, which is far lower than the average level of 15% increase in farmers’ income driven by rural e-commerce in the country. More than 60% of walnuts rely on local markets and wholesalers for circulation, with an online-sales penetration rate of less than 10%. Problems such as low added value of products and weak brand awareness are prominent. At the same time, the nut consumption market has an annual growth rate of 12%, highlighting the sales demand of Cao Fan walnuts.

### 3) Policy empowerment and landing obstruction

The “14<sup>th</sup> Five-Year Plan for the Development of E-commerce” lists “new forms of rural e-commerce” as the focus, Shandong Province clearly supports the creation of “e-commerce brands of regional characteristic agricultural products”, and Zhangqiu District has included Cao Fan walnut in the characteristic industry support plan. However, the transformation of policy dividends has been hindered: the coverage rate of cold chain logistics is less than 30%, the gap of farmers’ e-commerce training is more than 65%, and the construction of regional public brands is lagging behind, resulting in the disconnection of the practice of “the government is hot and the market is cold”.

#### 4) E-commerce-driven rural revitalization

In 2024, the national rural online retail sales will increase by 6.4% year-on-year, and the online retail sales of agricultural products will increase by 15.8% year-on-year. Demonstrate that rural e-commerce has become a catalyst for promoting agricultural and rural modernization [6]. Relying on the quality of national geographical indications and the taste advantages of “crispy and sweet”, Cao Fan walnut has the potential for differentiated competition. However, its e-commerce process faces three core contradictions: the conflict between standardized production and decentralized operation, the lack of cultural premium ability, and the high cost of the supply chain. In this context, exploring the integration path of “e-commerce + culture + mechanism innovation” has become an inevitable choice to activate industrial value and promote rural revitalization.

### 3. Text

#### 3.1. The Development and Current Situation of Cao Fan Walnut

##### 1) Current status of industrial foundation

The planting area of Canfan walnuts has reached 2000 mu in 2024, up 30% from 2020, with the number of growers rising across multiple villages like Canfan and Fannan Villages. The yield surged 40% from 500 tons in 2020 to 700 tons in 2024. However, output fluctuates due to natural disasters and inconsistent planting techniques, disrupting market supply [7].

Benefiting from local soil and climate, the nuts are plump and crispy. Tests show they're rich in protein, unsaturated fatty acids, vitamin E, calcium, iron, zinc, etc., holding great potential in the health-food market [8]. But their appearance is a downside. The individual sizes vary greatly and the shell color is uneven, making them less visually appealing than well-screened competitors, thus weakening their competitiveness in the high-end market.

##### 2) Current situation of e-commerce sales

Caofan walnuts have been listed on Taobao, Pinduoduo and Douyin Shop, totaling 50 stores (20 on Taobao, 15 on each of the other two). Most stores are in the early stage, with simple page design and unprofessional product display, and only a few are highly active and frequently update products.

Currently, Caofan walnut e-commerce sales mainly rely on retail via online stores 9. Although some merchants have tried group-buying, participation is low and no scale effect has been achieved. Live-streaming marketing and community marketing are still in the exploration stage, only carried out during holidays or promotions with low frequency. Community marketing mainly consists of merchant-organized WeChat groups with limited members, poor interactivity and weak dissemination power.

##### 3) Current status of brand building

At present, Cao Fan walnuts lack a unified and distinctive logo. Most merchants use brand logos with simple designs that do not fully reflect the characteristics of Cao Fan walnuts and the local culture [9]. The promotion of Cao Fan walnuts

mainly relies on traditional methods such as offline agricultural product fairs and publicity stalls in farmers' markets. The online promotion efforts are insufficient. The advertising forms are single, the coverage of advertising is narrow, and there is a lack of influential promotional content for discussion. As a result, the brand's spread on the Internet is limited.

Among consumers who have purchased Cao Fan walnuts, about 70% expressed satisfaction with the taste and quality of the products. However, the proportion of consumers satisfied with the product packaging, logistics distribution, and after-sales service is relatively low. Some consumers have reported that the products they received had damaged packaging, and the walnuts became damp and deteriorated due to the long logistics transportation time, which has had a negative impact on the brand's reputation and reduced consumers' willingness to make repeat purchases.

#### **4) Current Status of Logistics Distribution**

In the Cao Fan area, the construction of logistics infrastructure is relatively lagging behind. The coverage of logistics outlets is limited, and some remote planting areas have not yet achieved comprehensive coverage of logistics outlets, resulting in inconvenience in the delivery of agricultural products. In terms of warehousing facilities, there is a lack of specialized agricultural product warehousing centers, and there are deficiencies in aspects such as moisture-proofing, pest control, and ventilation, which affect the storage quality and shelf life of the products.

The efficiency of logistics distribution is relatively low. On average, it takes 5 days for agricultural products to be delivered from the place of origin to major consumer cities, which is 2 days longer than the average delivery time of high-quality agricultural product e-commerce platforms in the industry. The accuracy rate of distribution is about 85%, and problems such as package loss and misdelivery exist. During peak logistics periods, such as holidays, the delivery time will be further extended, which seriously affects consumers' shopping experience [10].

#### **5) Current Status of E-commerce Talents**

The number of people engaged in the e-commerce business of Cao Fan walnuts is relatively small. According to statistics, there are about 30 such people. In terms of professional background, only 20% of them graduated from majors related to e-commerce, marketing, logistics management, etc. Most of the personnel transitioned from walnut growers or local residents.

The skill structure of e-commerce practitioners is rather single, and they only master basic e-commerce operation skills. In terms of store operations, the proportion of personnel capable of store decoration and data analysis is less than 10%. In terms of marketing and promotion, there are relatively few people who can skillfully use marketing means such as live streaming sales and search engine optimization, accounting for about 15%.

In addition, the local area has not yet established a sound e-commerce talent training mechanism, and there is limited cooperation with universities and professional training institutions. The internal training system is also incomplete,

lacking professional training teachers and a systematic training curriculum, which fails to meet the demand for talents brought about by the rapid development of the e-commerce business [11].

### **3.2. The Main Problems Affecting the Development of Cao Fan Walnut**

#### **1) The Appearance Standard Shortcomings Restrict Market Development**

The appearance of Caofan walnuts has significant shortcomings such as obvious size differences among individual nuts and uneven shell color [12]. When displayed on e-commerce platforms, these characteristics lack visual appeal. Consumers tend to be attracted by competitors' products that have a neat appearance and beautiful color. Especially in the high-end market, where the requirements for product appearance are more stringent, the appearance disadvantages of Caofan walnuts limit their market expansion. As a result, they struggle to gain a competitive edge in the market, which affects both the selling price and market share.

There is a lack of unified standards from planting to processing and packaging. During the planting process, there are substantial differences in how farmers operate in terms of fertilization, irrigation, and pest and disease control, leading to inconsistent quality of walnuts. The processing stage also lacks strict regulations, resulting in non-uniform product specifications. This situation means that consumers may experience variations in the taste and size of the products they purchase each time, making it difficult to form a stable consumption experience. This severely impacts consumer trust and repurchase rates [13].

#### **2) The Vague Brand Positioning Restricts Market Expansion**

Caofan walnuts lack a clear and precise brand positioning. They fail to accurately focus on the target consumer group and do not highlight the unique selling points and core competitiveness of the products [14]. This vague brand positioning results in an indistinct brand image, with low consumer recognition and memory of the brand. Consequently, it is difficult for the brand to stand out among numerous agricultural product brands and effectively attract consumer attention and purchases.

The advertising formats used on e-commerce platforms are monotonous and have a narrow scope. On social media platforms, there is a lack of influential promotional content and topic discussions. This promotional model limits the brand's dissemination range, resulting in low brand awareness in the national market. It is difficult to reach more potential consumers, which restricts the expansion of brand influence and market reach.

#### **3) E-commerce Operation Capacity Hinders Sales Innovation**

The e-commerce sales of Caofan walnuts overly rely on the retail channels of e-commerce platforms, with insufficient application of emerging channels such as group buying, live-streaming sales, and community marketing. Live-streaming sales are only conducted during specific holidays or promotional events, a low

frequency. Community marketing mainly relies on WeChat groups established by the merchants themselves, which have limited membership and poor interactivity and dissemination power. The single sales channel makes it difficult to cover different consumer groups, restricting the market sales volume and the increase of market share of the products.

The number of people engaged in the e-commerce business of Caofan walnuts is small, and their professional quality is low. Most of them only have basic e-commerce operational skills, with only 20% of the personnel having graduated from relevant majors. The shortage of e-commerce talents leads to low shop operation levels, poor effects, and low logistics delivery efficiency, which severely restricts the innovation and expansion of e-commerce business [15].

#### **4) Lagging Infrastructure Construction Affects Consumer Experience**

The construction of network infrastructure in Caofan area is relatively backward, with network coverage gaps and poor signal stability. This has impacted the online transaction and live-streaming sales segments of e-commerce operations, resulting in live-streaming lags and delays in online transactions. Consequently, the shopping experience of consumers has been diminished, and the work efficiency of e-commerce practitioners has been affected, hindering the efficient conduct of e-commerce business. The logistics network in Caofan area is also insufficiently covered, making it difficult to ship from remote planting areas. The warehousing facilities are rudimentary, and there is a lack of specialized agricultural product warehousing centers. The logistics delivery efficiency is low, with an average delivery time exceeding the industry's optimal level by 2 days, and a delivery accuracy rate of only 85%. During logistics peak periods, the delivery time is even longer. The logistics costs are high, with significant proportions accounted for by transportation, packaging, and cold chain logistics costs. These logistics issues have increased product losses and operating costs, restricted the sales scope of products, and severely affected consumers' shopping experience and repurchase rate [16].

#### **5) Weak Policy and Industrial Support Restrict E-commerce Development**

The government's policy support for the Caofan walnut e-commerce industry is insufficient. The policies related to financial subsidies, tax incentives, and land use are not comprehensive enough [17]. The implementation of policies is not in place, with issues in the publicity and execution processes, making it difficult for e-commerce practitioners to enjoy policy benefits. As a result, they are unable to effectively alleviate financial pressure, which restricts the development speed and scale of the industry.

The supporting system for the e-commerce industry surrounding Caofan walnuts is not well-developed. There is a lack of deep processing capabilities, leading to low product added value, with most products being sold as primary goods. The packaging design lacks professional support, failing to highlight product features and brand image. Financial support is also inadequate, making it difficult for e-commerce practitioners to obtain financing, which constrains business expansion

and innovation.

### 3.3. The Main Problems Affecting the Development of Cao Fan Walnut

#### 1) The Elements of the “Chu Orange” Model

##### ① Precise Product Positioning

Chu Orange has positioned its target market as the mid-to-high-end consumer group. With the improvement of people’s living standards, consumers have higher demands for the quality and taste of fruit and are willing to pay higher prices for high-quality fruit. Chu Orange has seized this market demand and is committed to providing high-quality navel oranges, meeting the mid-to-high-end consumers’ pursuit of healthy and delicious fruit. Chu Orange emphasizes the unique qualities of its navel oranges, such as thin skin, no seeds, juicy and sweet taste. Through careful cultivation and scientific management, it ensures that each orange has a stable high quality, thereby forming a differentiated competitive advantage in the market.

##### ② Strict Quality Control

Chu Orange has established a strict orchard management system, with detailed standards and operating procedures for every link from soil improvement, fertilization and irrigation, pest and disease control to pruning and fruit thinning. For example, in fertilization, fertilizers are precisely proportioned according to the different growth stages of the oranges to ensure the nutritional needs of the fruit trees. In pest and disease control, a combination of biological and physical control methods is used to reduce the use of chemical pesticides and ensure the green and safe quality of the fruit. Multiple quality inspection checkpoints have been set up, with strict quality inspections at every stage from orchard picking to packaging and transportation. Only oranges that meet the standards are allowed to enter the market, ensuring that every Chu Orange purchased by consumers is of high quality.

##### ③ Innovative Marketing Model

Behind Chu Orange lies the legendary life story of Chu Shijian, which endows the brand with profound emotional value. By publicizing Chu Shijian’s indomitable and enterprising spirit in adversity, the brand resonates emotionally with consumers, making Chu Orange not just a kind of fruit, but a symbol of a spirit. The brand fully utilizes internet platforms for promotion and sales [18]. Through cooperation with e-commerce platforms, it conducts online pre-sales and crowd funding activities, which attract a large number of consumers to pay attention to and purchase the product. Meanwhile, it leverages social media for word-of-mouth dissemination, expanding the brand’s influence through users’ sharing and recommendations.

##### ④ Efficient Supply Chain Management

To ensure the freshness and quality of the oranges, Chu Orange has established a comprehensive cold chain logistics system. Immediately after being picked from the orchard, the oranges undergo pre-cooling treatment and are then quickly de-

livered to consumers through cold chain transportation. The application of cold chain logistics effectively extends the shelf life of the oranges, ensuring that consumers can enjoy fresh and delicious Chu Oranges. Chu Orange also strengthens collaboration with partners such as suppliers and dealers, achieving information sharing and resource integration. By optimizing the supply chain process, operational efficiency is improved, costs are reduced, and consumers are provided with products that offer better value for money.

## **2) Analysis of the Reasons for the Success of the Chu Orange Model**

### **① Meeting the Needs of Consumption Upgrade**

With the improvement of people's living standards and the transformation of consumption concepts, consumers have higher demands for the quality and experience of agricultural products. Chu Orange has accurately positioned itself in the mid-to-high-end market and met consumer needs with high-quality products, thereby catering to the trend of consumption upgrade.

### **② Successful Integration of Brand Building and Emotional Marketing**

By telling the story of Chu Shijian, Chu Orange has closely integrated the brand with emotions, resonating with consumers on an emotional level. This emotional marketing approach has not only increased the brand's visibility and reputation but also cultivated consumer loyalty, laying a solid foundation for the long-term development of Chu Orange.

### **③ Marketing Innovation in Line with the Times**

In the Internet era, Chu Orange actively embraces new technologies and adopts Internet-based marketing methods to expand its sales channels and enhance its brand influence. By combining online and offline approaches, it meets the purchasing needs of different consumers and achieves rapid growth in sales performance.

## **3) Inspirations and References from the Chu Orange Model**

### **① Focus on Product Quality to Build Core Competitiveness**

In today's increasingly competitive market, enterprises must prioritize product quality to achieve success. Like Chu Orange, they should establish a strict quality control system, starting from the source, to ensure the quality and safety of their products. High-quality products win the trust and recognition of consumers.

### **② Unearth Brand Stories to Convey Brand Value**

Brand stories are an important bridge for communication between enterprises and consumers [19]. Enterprises can endow their brands with more emotional value and cultural connotations by exploring their own historical culture, entrepreneurial stories, etc., triggering emotional resonance among consumers, thereby enhancing brand awareness and reputation.

### **③ Innovate Marketing Models to Expand Market Space**

With the continuous progress of technology and the changing needs of consumers, enterprises must continuously innovate marketing models to meet the requirements of the times. They can leverage emerging channels such as the Internet and social media to carry out diverse marketing activities, expand market

space, and increase brand influence and market share [20].

④ Strengthen Supply Chain Management to Improve Operational Efficiency

Efficient supply chain management is an important guarantee for the sustainable development of enterprises [21]. Enterprises should strengthen collaborative cooperation with partners such as suppliers and dealers, optimize supply chain processes, improve operational efficiency, reduce costs, and provide consumers with better products and services.

## 4. The Solution

### 1) Optimize the Policy Environment

① Formulate Special Support Policies

The government has established a special support fund for the Cao Fan walnut e-commerce industry, which is used to subsidize key areas such as e-commerce infrastructure construction, brand cultivation, and talent training. Rewards are given to enterprises and farmers engaged in Cao Fan walnut e-commerce business whose annual sales growth reaches a certain proportion [22]. At the same time, for e-commerce enterprises and growers, certain tax reduction and exemption preferences are given in aspects such as value-added tax and income tax within a certain period to reduce their operating costs.

② Improve the Market Supervision System

Establish and improve the market supervision mechanism for agricultural product e-commerce, and strengthen the daily inspection and sampling inspection of the Cao Fan walnut e-commerce platform. Formulate strict product quality standards and market access rules. Products that do not meet the quality standards are prohibited from being sold in the e-commerce market. Illegal merchants will be severely punished according to the law. In case of serious circumstances, their business licenses will be revoked. Strengthen the supervision of e-commerce advertising, and crack down on illegal acts such as false publicity and exaggeration of efficacy, so as to maintain a fair and competitive market environment and protect the legitimate rights and interests of consumers [23].

### 2) Guide Social Participation

① Promote Enterprise Cooperation

Encourage e-commerce enterprises specializing in Cao Fan walnuts to engage in in-depth cooperation with large e-commerce platforms to strive for the platforms' support in terms of traffic, technical assistance, and marketing resources. Establish long-term and stable cooperative relationships with logistics enterprises to jointly optimize logistics distribution routes, increase vehicle load rates, and reduce logistics costs. Promote cooperation between Cao Fan walnut growers and agricultural product processing enterprises to carry out order-based production, achieve standardized cultivation and scaled processing, and enhance the added value of products [24].

② Develop Community Group Buying

Actively develop the community group buying model for Cao Fan walnuts. Or-

ganize local e-commerce enterprises and growers to cooperate with community group buying platforms and carry out group buying activities [25]. Establish community group buying service stations to improve distribution efficiency and reduce logistics costs. Through community group buying, not only can sales channels be expanded, but consumer needs can also be precisely met, thereby enhancing customer satisfaction. For example, cooperate with community group buying platforms such as Xingsheng Youxuan and Duoduo Grocery to regularly launch Cao Fan walnut group buying packages to attract community residents to make purchases [26].

### 3) Promoting Technological Innovation

#### ① Enhancing Planting and Processing Technology

Promote advanced planting techniques to increase the yield and quality of walnuts. Cultivate superior varieties to address the issue of significant differences in the appearance of Caofan walnuts, thereby enhancing product market competitiveness [27]. Introduce advanced agricultural processing equipment and technologies to improve the processing level of Caofan walnuts. Encourage enterprises to engage in deep processing and develop a variety of products such as walnut-based snacks and nutritional health products. This will extend the industrial chain and increase product added value.

#### ② Innovating “Immersive E-commerce” Experience

Pioneering a “cloud planting + traceability live-streaming + offline picking” integrated model [28]. Consumers can claim walnut trees online via VR technology and monitor their growth in real-time. Hosts conduct traceability live-streaming in the fields to showcase traditional planting techniques. Offline, a “Walnut Culture Festival” is organized to attract visitors to experience picking. This creates a mutual flow of online and offline traffic and enhances user engagement.

### 4) Raise Public Awareness

#### ① Carry out Popular Science Propaganda and Strengthen Consumption Guidance

Popularize e-commerce knowledge and knowledge of agricultural product quality and safety among residents in the Cao Fan area by holding special lectures, distributing publicity materials, and carrying out online popular science activities. Provide training on agricultural product brand building and marketing knowledge to enhance the brand awareness and marketing capabilities of e-commerce practitioners. Advertise and hold tasting events to promote the nutritional value, taste characteristics, and consumption methods of Cao Fan walnuts to consumers, guiding them to establish healthy consumption concepts.

#### ② Create Brand Stories and Explore New Paths

The “e-commerce + characteristic industry + cultural integration” model breaks through the limitations of traditional agricultural product e-commerce, which only focuses on sales channels. It proposes the in-depth integration of the regional culture and planting history of Cao Fan walnuts with e-commerce. By exploring local elements such as “Zhangqiu Blacksmith Culture” and “Spring Wa-

ter Culture”, brand stories with cultural symbols (such as “Walnuts Nourished by the Millennium Iron Charm”) are created, endowing products with differentiated connotations and forming a dual-value output of “selling products + selling culture”. This has pioneered a new path of cultural empowerment in agricultural product e-commerce [29].

### 5) Building an Omni channel Sales Network

#### ① Diversifying Online Channels

Consolidate the operations of flagship stores on Taobao, JD.com, and Pinduoduo, customizing product assortments based on the user profiles of each platform (e.g., Pinduoduo focuses on cost-effective family packs, while JD.com emphasizes high-end gift boxes [30]). Enter Douyin Store and Kuaishou E-commerce, leveraging short video content (such as the “100 Ways to Eat Cao Fan Walnuts” series) and influencer live-streaming (collaborating with “Sichuan Taotzi Sister” for a rural gourmet-themed special event) to reach lower-tier markets. Establish a WeChat Mini Program mall, enhancing repurchase rates through community-based growth strategies (e.g., “Bring a Friend and Get 20% Off”) and exclusive membership discounts (e.g., birthday gift packs), aiming to double the annual average spending of private domain users compared to regular customers.

#### ② Upgrading Offline Channels

Collaborate with retail chains like Yonghui Superstores and Hema Fresh to set up dedicated “Cao Fan Walnuts Counters,” complemented by tasting events and cultural displays (e.g., “A Millennium of Cultivation History”), targeting coverage of 2000 locations across 50 cities nationwide. Open brand experience stores at tourist attractions such as Zhangqiu Baima Spring Scenic Area and Zhujia Valley Ancient Village, selling themed gift boxes like “Spring Water-Nourished Walnuts.” Visitors can scan QR codes to access the online store, creating a closed-loop ecosystem of “offline experience to online repurchase.” Partner with convenience store chains like Meiyijia and Bianlifeng to stock portable 50 g packs in community stores, catering to on-the-go snacking needs and seizing snack consumption opportunities.

#### ③ Innovating Emerging Channels

Collaborate with content platforms like RED note and Xiaohongshu (Little Red Book) to publish articles and videos on topics such as “Walnut Health Recipes” and “Intangible Cultural Heritage Roasting Techniques,” embedding product links to attract health-conscious consumers. Develop corporate welfare procurement channels, offering customizable gift boxes (with options to print company logos) and partnering with banks, insurance companies, etc., aiming to secure contracts with over 100 corporate clients annually. Open offline experience stores in overseas Chinese communities (e.g., Los Angeles, Singapore), linking to cross-border e-commerce platforms like Ali Express via QR codes, enabling a “showroom offline, global purchase online” model.

### 6) Intensify Talent Cultivation

Carry out an “E-commerce Literacy” campaign for farmers, training 1000 per-

son-times annually, with a focus on practical skills such as live-streaming scripts, photo shooting, and order processing. Those who pass the assessment will be issued a certificate and rewarded with a 500-yuan entrepreneurship subsidy. Practitioners should cooperate with Alibaba Digital Countryside Academy to offer advanced courses like “Gold Medal E-commerce Operation Officer” to cultivate 100 professionals with data analysis and brand planning capabilities [31].

Implement the “Returning Swan Plan” [32], providing three-year interest-free loans for college students returning to their hometowns for e-commerce entrepreneurship, and giving priority to allocating logistics and warehousing land. Introduce MCN institutions’ anchor talents, offering settlement subsidies and tax incentives. Establish an “E-commerce Mentor Pool”, hire platform operation experts and internet celebrities as industrial consultants, and implement a “one mentor + ten demonstration households” pairing assistance model.

## 5. Conclusions

This report focuses on the theme of how the e-commerce of Caofan walnuts contributes to rural revitalization. It provides an in-depth analysis of the current development status, challenges, and influencing factors, and offers targeted policy recommendations. In recent years, the walnut industry in Caofan has achieved certain progress, with an expanding planting scale and increasing production. E-commerce sales have also shown an upward trend. However, there are still many shortcomings in infrastructure, brand building, e-commerce operations, and industrial supporting facilities, which restrict further development.

Through research, it has been found that although Caofan walnuts have quality advantages, differences in appearance quality and low standardization levels have affected market competitiveness. In terms of brand building, unclear positioning and weak dissemination have led to limited brand awareness and influence. E-commerce operations are also insufficient, with single sales channels and a shortage of e-commerce talents. Infrastructure is not perfect, with prominent issues in network communication and logistics distribution. The market environment is also challenging, with information asymmetry and fierce competition. Insufficient policy support and incomplete industrial supporting facilities also limit industrial development.

In response to the above problems, the report puts forward a series of countermeasures and suggestions. These include optimizing the policy environment by formulating special support policies and strengthening market supervision; guiding social participation by promoting corporate cooperation, encouraging the participation of public welfare organizations, and developing community group buying; promoting technological innovation by strengthening planting and processing technology innovation and deepening the application of e-commerce technology; enhancing public awareness through popular science publicity and strengthening consumer guidance; and establishing long-term mechanisms by improving the interest linkage mechanism and perfecting the quality traceability

mechanism.

With the continuous advancement of the rural revitalization strategy and the in-depth development of the digital economy, the future of Caofan walnut e-commerce industry is promising. If the countermeasures and suggestions are effectively implemented, Caofan walnuts are expected to break through development bottlenecks and achieve industrial upgrading. With policy support, infrastructure will be continuously improved, network communication and logistics distribution efficiency will be increased, and operating costs will be reduced. Brand building will be strengthened with accurate positioning and effective publicity, which can enhance brand awareness and reputation and improve market competitiveness. E-commerce operation capabilities will be enhanced with diversified sales channels and sufficient e-commerce talents, which can fully explore the potential of e-commerce channels. Technological innovation will promote progress in planting and processing technologies and improve product quality and added value. The improvement of public awareness will create a favorable industrial development atmosphere, and long-term mechanisms will ensure sustainable development of the industry.

In the short term (1 - 2 years), the infrastructure of Caofan walnut e-commerce industry will be initially improved, brand publicity efforts will be increased, the professional skills of e-commerce practitioners will be enhanced, and e-commerce sales will achieve certain growth. In the medium term (3 - 5 years), brand awareness will be significantly improved, sales channels will be more diversified, product added value will increase, industrial supporting facilities will be gradually improved, and the proportion of e-commerce in overall sales will be greatly increased. In the long term (5 - 10 years), Caofan walnuts are expected to become a well-known e-commerce brand with regional characteristics and market influence. The industry will achieve scaled and intensive development, which will strongly promote rural revitalization in Caofan area, drive the comprehensive prosperity of the rural economy, and provide a successful example for other regions to develop characteristic agricultural product e-commerce.

## Conflicts of Interest

The author declares no conflicts of interest.

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