

A Study on the Challenges and Optimization Strategies for the Development of Cross-Border E-Commerce for Specialty Agricultural Products in County-Level Regions

Caizhou Cui

School of Foreign Languages and Cultures, Zhaoqing University, Zhaoqing Guangdong, CO 526061, China

Email: 455962749@qq.com

How to cite this paper: Cui, C. (2026). A Study on the Challenges and Optimization Strategies for the Development of Cross-Border E-Commerce for Specialty Agricultural Products in County-Level Regions. *Sustainable Development*, 2(1), 1–19. ISSN Print: 3104-4174, ISSN Online: 3104-4182.

<https://doi.org/10.63313/SD.9019>

Published: 2026-10-12

Copyright © 2026 by author(s) and Erytis Publishing Limited.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Abstract

Against the backdrop of the digital economy's deep penetration into the rural revitalization sector, the digital transformation of cross-border trade in distinctive county-level agricultural products has emerged as a new model for foreign trade development—one that unlocks the value of local agricultural resources, opens up domestic and international distribution channels for agricultural products, and fosters a competitive edge in the agricultural industry. The development bottlenecks currently facing the growth of cross-border e-commerce for county-level agricultural products are not merely shortcomings in a single link of the industrial chain. Rather, they represent systemic challenges across the entire industrial chain resulting from the mutual constraints and cumulative effects of six core elements: cold-chain logistics systems, market-oriented brand operations, international trade compliance, port clearance services, multidisciplinary professionals, and cross-border financial services. Development shortcomings across these dimensions are interrelated and mutually restrictive, forming a negative feedback loop that is difficult to break through independently. Taking a full-industry-chain development perspective as its core entry point, this paper systematically analyzes the intrinsic relationships and coupling mechanisms among the six constraining factors. Drawing on practical industrial case studies from typical counties in China, it establishes a multi-stakeholder collaborative governance framework for industrial development and proposes a set of systematic, actionable industrial optimization strategies, including the upgrading of cross-border supply chains and cold-chain systems, the establishment of a dual-track brand cultivation system and a full-chain international compliance empowerment system, the optimization of port customs clearance facilitation mechanisms, the development of a tiered, multidisciplinary talent training mechanism, and the construction of a diversified cross-border financial support system.

Keywords

County-level Specialty Agricultural Products; Cross-Border E-Commerce; Development Challenges; Full Industrial Chain; Optimization Pathways

1. Introduction

County-level specialty agricultural products, drawing on regional soil and water resources, unique genetic resources, and traditional cultivation, breeding, and processing techniques, possess distinct market competitive characteristics of differentiation and scarcity. These include both regional public-brand products with high market recognition and mature brand systems—such as Wuchang Rice and Anhua Black Tea—as well as specialty agricultural byproducts with outstanding development potential, such as Anyue Lemons and Binchuan fruits and vegetables. Based on the “One County, One Product” industrial development strategy, various regions are integrating full-chain resources—including large-scale cultivation, precision processing, warehousing and preservation, and cross-border transportation—to strengthen the supply base and industrial foundation of the county-level agricultural product cross-border e-commerce sector [1].

Cross-border e-commerce for county-level specialty agricultural products represents a key business model in the digital transformation and upgrading of traditional foreign trade. Centered on large-scale county-level specialty agricultural industrial bases, it relies on diverse channels—such as B2B cross-border trading platforms, independent brand websites, and overseas social e-commerce—to complete the entire cross-border transaction process. Compared to traditional offline foreign trade models, this new business model effectively streamlines multi-tiered distribution systems, avoids the drawbacks of successive markups by middlemen, and enables precise matching between producers at the source and end consumers overseas. While increasing the operating profits of farmers and agri-processing enterprises, it also provides overseas consumers with specialty agricultural products that offer excellent value for money, representing a digital innovation and upgrade of traditional agricultural foreign trade models [2].

The rapid development of the cross-border e-commerce industry for county-level specialty agricultural products has been driven by both national policy support and demand from overseas markets. The national “14th Five-Year Plan” for digital economic development and successive Central Document No. 1s have all emphasized the “digital commerce for agricultural revitalization” strategy, positioning the internationalization of agricultural products and the upgrading of agricultural openness as core measures for rural industrial revitalization [3]. Major agricultural provinces have introduced targeted support policies tailored to regional industrial characteristics. Anxi County in Fujian has established a digital traceability and supervision system for tea, enabling end-to-end traceability and control over

the production, distribution, and export of agricultural products; Wugong County in Shaanxi has built a county-level bonded warehousing base, creating a convenient channel for agricultural products from inland regions to reach overseas markets; Binchuan, Yunnan, has implemented a 24-hour rapid customs clearance mechanism and established a special industrial support fund to comprehensively assist local specialty agricultural products in expanding into international markets [4].

From the perspective of the industry's overall development, the core contradiction in the current development of cross-border e-commerce for county-level specialty agricultural products is primarily manifested as a structural imbalance between high-quality agricultural resources and extensive management models, as well as lagging supporting service systems. Although the scale of cross-border trade in domestic county-level specialty agricultural products has been rising year by year, issues such as insufficient adaptability of supporting services and weak coordination along the industrial chain have become key obstacles constraining the industry's efforts to improve quality, enhance efficiency, and achieve transformation and upgrading [5].

The domestic academic community has produced multidimensional and multilevel research findings on the constraints affecting the development of cross-border e-commerce for county-level agricultural products. In the area of standardization, existing research indicates that agricultural production in these counties is predominantly characterized by small-scale, scattered farming by individual households. The development of standardized systems—including unified grading, standardized processing, and quality inspection—lags behind, making it difficult for most products to meet international market access standards. The low coverage rate of international compliance certifications significantly hinders the process of taking agricultural products to international markets [6]. At the logistics and supply chain level, the distribution of cold-chain infrastructure in counties is uneven and coverage is limited; cross-border transportation times are insufficient and product wastage rates are high. The issue of wastage in the distribution of fresh agricultural products is particularly acute, directly affecting the industry's overall profitability [7][8]. In terms of brand building, small and medium-sized agricultural businesses in counties generally lack a long-term brand management mindset. They have long relied on an extensive business model focused on low prices and high volume, resulting in significant product homogenization and low brand recognition, making it difficult to achieve a market premium[3]. In addition, shortcomings in both software and hardware—such as an insufficient pool of cross-border professionals, difficulties in cross-border financing for small, medium, and micro enterprises, and a lack of exchange rate risk hedging tools—further constrain the industry's transformation and upgrading toward scale and high-end development[5].

In response to these industry pain points, domestic scholars have proposed several optimization measures based on actual industry conditions. The academic

community generally agrees that a comprehensive standardized system covering the entire process of agricultural product cultivation, processing, grading, and quality inspection must be established. This system should actively align with international quarantine standards and quality specifications to enhance the suitability of agricultural products for international markets [1]; consolidate scattered county-level logistics resources to build a specialized and systematic cross-border cold-chain logistics system; leverage the advantages of industrial clusters to reduce logistics operating costs; and optimize end-to-end services—including warehousing, customs clearance, and cross-border distribution—to enhance the overall stability and circulation efficiency of the supply chain [7]; Deeply cultivate regional public brand development, leveraging distinctive local agricultural resources to create exclusive industrial IPs, thereby achieving differentiated brand competition and growth [3]; Improve talent development and cross-border financial support systems by cultivating specialized cross-border talent through targeted university-enterprise partnerships, and by strengthening support mechanisms for cross-border financing and exchange rate hedging to address the industry's soft development shortcomings [2].

Although existing research has established a basic framework for industrial study, certain limitations remain. Most research findings focus on general countermeasures at the macro level, lacking differentiated and refined implementation plans tailored to the distinct resource endowments of different counties. Furthermore, there is insufficient depth in research on the coupling mechanisms, synergistic constraints, and long-term governance pathways of various development shortcomings. Based on this, this paper adopts the perspective of differentiated county-level industrial development to thoroughly analyze the intrinsic connections among the six major development challenges and explore effective pathways for the coordinated governance of multidimensional bottlenecks, thereby providing scientific theoretical support and practical paradigms for the long-term, high-quality development of cross-border e-commerce for county-level agricultural products.

2. Mainstream Development Models and Industry Status of Cross-Border E-Commerce for Specialty Agricultural Products in County-Level Regions

Cross-border e-commerce for specialty agricultural products in China's counties is gradually taking on an overall pattern of cluster-based development and a focus on high-quality products; however, regional development imbalances remain a prominent issue, with significant disparities in industrial development between the eastern and western regions. Leveraging their superior port locations, mature industrial foundations, and well-developed supporting service systems, counties in the eastern coastal regions have a much higher cross-border e-commerce

penetration rate (the ratio of cross-border e-commerce exports to total county-level goods trade exports) than counties in the central and western regions, which are rich in agricultural resources; yet, the vast potential for industrial development in these eastern counties has not yet been fully realized [9]. Overall, there are significant disparities in the operational effectiveness of cross-border e-commerce industrial parks nationwide. The core differences primarily manifest in two dimensions: the degree of integration between local specialty industries and cross-border business models, and the level of sophistication of the supporting industrial chain systems. Based on practical implementations across various regions, four types of replicable, sustainable, and mature operational models have now emerged in China's counties.

2.1. Model of Industrial Clusters Collaborating with Leading Cross-Border Platforms

The model of industrial clusters collaborating with leading cross-border e-commerce platforms is currently the most adaptable and widely applied mainstream development model. This model relies on large-scale local specialty industrial belts as its core foundation and leverages the traffic resources and channel advantages of leading cross-border e-commerce platforms to achieve bulk exports and large-scale global expansion of agricultural products. The Tieguanyin tea industry in Anxi, Fujian, is a typical example of this model. Relying on Alibaba International, it has established an integrated system for production control, quality verification, and cross-border sales; In 2024, Anxi's oolong tea (primarily Tieguanyin) exports reached 12,000 metric tons, with products exported to 65 countries and regions worldwide, generating an annual export value of 980 million yuan [10]. Additionally, specialty agricultural products from Cao County, Shandong, have achieved large-scale expansion into overseas markets through mainstream cross-border platforms such as Amazon, steadily expanding their presence in international consumer markets.

2.2. Bonded Warehousing + Multimodal Logistics Support Model

The bonded warehousing + multimodal logistics support model effectively addresses the two core challenges facing cross-border logistics for agricultural products in county-level areas: low efficiency and cumbersome customs clearance procedures. Inland counties leverage the resource advantages of dedicated bonded warehouses and regional logistics hubs, linking them with core logistics arteries such as the China-Europe Railway Express and the New Western Land-Sea Corridor to build an integrated cross-border distribution network. In Wugong County, Shaanxi, a dedicated county-level e-commerce bonded warehouse has been established to integrate multimodal transport resources and optimize cross-border distribution chains. With a cross-border e-commerce transaction volume of 95

million yuan in 2024, this initiative has effectively addressed industry pain points such as poor coordination across multiple links in the industrial chain, time-consuming customs clearance at ports, and high comprehensive transportation costs, providing a mature practical model for the export of agricultural products from inland counties [11].

2.3. Innovative Operational Models Combining Local Products with Cross-Border Live Streaming.

Leveraging overseas social media platforms such as short-video and live-streaming e-commerce, these initiatives showcase the natural growing environments and distinctive traditional processing techniques of county-level agricultural products in real-life settings. By aligning with the demand for scenario-based and immersive marketing of agricultural products, they precisely target overseas end consumers. Wuguan County in Shaanxi was the first to implement this innovative business model, conducting multilingual live-streamed sales via overseas platforms such as TikTok to create new scenarios for the overseas marketing of county-level agricultural products. However, this model places high demands on the ability to operate in less-commonly-spoken languages, create cross-cultural content, and conduct refined operations targeting overseas users. Currently, it has achieved scalable profitability only in high-quality industrial clusters, while most counties remain in the pilot and exploratory phase.

2.4. Full-Industry-Chain Integration Model

The full-industry-chain integration model represents an advanced stage of industry development. Led by leading local agribusinesses, this model integrates resources across the entire value chain—including large-scale agricultural production, standardized quality control, cross-border exports, and market-oriented brand operations—to achieve integrated advancement in standardized production, compliant customs clearance, and the global expansion of proprietary brands. In Dayao, Yunnan, leading local agribusinesses have consolidated regional forestry and fruit resources, established a standardized quality control system and a digital traceability platform, and consistently and stably exported specialty agricultural products such as chestnuts and walnuts. By deeply cultivating niche overseas markets in Southeast Asia and Central Asia, they have achieved high-quality international expansion for the industry.

Practical experience from model counties across the country has fully demonstrated that the key to the long-term development of cross-border e-commerce for agricultural products lies in establishing a seamless service chain from the production area to overseas end markets, thereby achieving synergistic empowerment among local agricultural resources, online sales channels, and logistics infrastructure. Currently, the industry's entire supply chain still contains

numerous weak links; various developmental shortcomings are intertwined and mutually constraining, creating a systemic, closed-loop developmental dilemma that severely hinders the industry's quality improvement and upgrading.

3. Analysis of Full-Chain Constraints on Cross-Border E-Commerce for Specialty Agricultural Products in County-Level Regions

The obstacles to the development of cross-border e-commerce for specialty agricultural products in county-level regions span the entire industrial chain. The six major constraints—cold-chain logistics, port clearance, international compliance, brand management, specialized talent, and cross-border finance—do not exist in isolation. Rather, they are interlinked and mutually reinforcing, forming a closed-loop negative cycle that is difficult to break at any single point. The underlying logic and core pain points of each factor are as follows.

3.1. Pronounced Shortcomings in Cross-Border Logistics and Cold-Chain Infrastructure, Resulting in High Distribution Losses and Costs

Cold-chain logistics is the core safeguard for the cross-border export of fresh agricultural products, directly determining product quality during distribution, transportation timeliness, and corporate profit margins. Currently, the shortcomings in county-level cold-chain development are primarily concentrated in three dimensions: a lack of supporting facilities at the point of origin, insufficient international trunk line transport capacity, and lagging end-to-end digitalization. High-quality domestic cold chain resources are highly concentrated in core cities in the eastern region, while the vast agricultural production areas in central and western China generally lack upstream supporting facilities such as field pre-cooling, intelligent sorting, and specialized cold storage. The industry suffers from a dispersed layout and inconsistent standards, resulting in low overall coverage of cold chain infrastructure. Only 35% of small and medium-sized agribusinesses in China have the capacity for temperature-controlled storage and transportation throughout the entire supply chain, which is far below the 90% adoption rate in developed countries. The cross-border spoilage rate for fresh agricultural products in county-level areas remains at 15%–20%, more than three times that of developed countries, and cold chain logistics costs account for over 30% of total product costs, significantly squeezing the profit margins of agribusinesses [12].

At the same time, there are significant gaps in the layout of international cold-chain warehousing at the county level. The export of agricultural products largely relies on standard ocean freight channels, with total transit times reaching up to 25 days. Dedicated air freight routes for fresh produce are scarce and freight rates are relatively high, while the pricing models for trunk transport capacity—such as the China-Europe Railway Express—struggle to meet the operational needs of small,

medium, and micro enterprises [9]. Most counties adopt a “drop-ship” model involving individual direct mail shipments, which prevents the pre-stocking of goods in overseas warehouses and bulk distribution, resulting in persistently high per-item logistics costs. Furthermore, data across the cross-border supply chain is fragmented, and end-to-end traceability systems are inadequate. Issues such as logistics delays and product spoilage occur frequently, making it highly likely to trigger mass returns overseas and, in the long term, damaging the reputation and market acceptance of county-level agricultural products abroad.

3.2. Lagging Regional Brand Development and Weak Ability to Command a Premium

Currently, agricultural products from county-level regions in China generally face the developmental challenge of “abundant resources, weak branding, and insufficient price premiums.” Irregular management of regional public brands, a lack of awareness among enterprises regarding the cultivation of their own brands, and insufficient cross-cultural communication capabilities have led products to be trapped in a long-term cycle of low-price competition, making it difficult to build core brand competitiveness. Domestic public brands with geographical indications lack unified management standards in overseas markets, and some merchants engage in violations such as passing off inferior products as superior ones or dumping goods at low prices, severely damaging the international reputation of regionally distinctive product categories. Small and medium-sized agribusinesses rely excessively on the traffic benefits provided by public brands while neglecting the cultivation of their own brands. Constrained by limited financial resources and professional operational capabilities, they struggle to register intellectual property overseas or conduct systematic brand management. As a result, high-quality local agricultural products ultimately become unbranded, generic goods, leaving them with severely limited market influence.

In terms of brand promotion, the issue of industry homogenization is particularly pronounced. Most enterprises merely rely on generic marketing slogans such as “natural” or “organic,” failing to deeply tap into their core differentiators, such as regional agricultural culture and intangible cultural heritage processing techniques. At the same time, companies directly replicate domestic promotional content and communication models, ignoring overseas consumer mindsets, aesthetic standards, and cultural taboos, which makes them highly susceptible to operational losses such as unsold inventory and full-container returns. Furthermore, since agricultural products in county-level areas are primarily produced by small-scale, individual farmers, there is a lack of unified control over product specifications and quality. Compared to similar products supported by standardized brand systems, the price premium gap in the end market can reach over 70 percent, and these shortcomings in industrial cluster development further constrain the enhancement of brand value.

3.3. Lack of International Quality Compliance Systems Restricts Access to Overseas Markets

There are significant differences among countries worldwide in testing standards, labeling regulations, and market access rules for agricultural products. Domestic county-level enterprises generally face issues such as a disconnect between domestic and international production standards, a lack of high-end international certifications, and incomplete cross-border traceability systems. Frequent compliance risks directly hinder the expansion into high-end overseas markets. Overseas standards for pesticide residue and microbial testing evolve rapidly. Most county-level businesses are only equipped to meet domestic regulatory requirements and lack the capacity to analyze and adapt to international trade rules. This frequently results in situations where products pass domestic inspections but fail overseas inspections, leading to significant operational losses such as product returns, destruction, and fines.

Internationally recognized certifications such as GlobalGAP and HACCP are core entry requirements for agricultural products to enter high-end supermarket markets in Europe and the United States. However, the decentralized smallholder farming model prevalent in county-level areas struggles to meet international certification standards. Furthermore, the certification processes are cumbersome and the overall costs are high, making them unaffordable for small, medium, and micro-enterprises. As a result, the coverage of high-end certifications in most industrial clusters remains low, forcing high-quality agricultural products to be exported via low-cost contract manufacturing models rather than penetrating high-premium, high-end consumer markets. Furthermore, current domestic agricultural product traceability systems only cover domestic front-end stages such as cultivation and processing, without integration with back-end processes like cross-border transportation and overseas customs clearance. Consequently, the data systems cannot be mutually recognized by overseas regulatory agencies. Since 2023, the majority of cases involving the return of exported agricultural products have stemmed from gaps in the cross-border traceability chain, forcing enterprises to conduct repeated testing and verification, which continuously drives up compliance costs and severely hampers the large-scale expansion of the industry into overseas markets.

3.4. Cumbersome Port Clearance Procedures and Inadequate Suitability for Fresh Produce

The perishable and fragile nature of fresh agricultural products creates an inherent conflict with cumbersome cross-border customs clearance and inspection procedures. Issues such as high inspection rates, complex declaration documentation, and a lack of data interoperability across departments compound to continuously increase enterprises' operating costs and the risk of product spoilage

[13]. Agricultural products are a key category subject to cross-border inspections, and the sampling rate for fresh produce is far higher than the inspection standards for general industrial goods. The typical duration of delays at ports of entry can reach 2–3 days, which can easily lead to a decline in the freshness of fruits and trigger issues such as refusal of acceptance by overseas customers and bulk returns. Differences in customs clearance efficiency across ports in various countries further exacerbate the uncertainty facing enterprises [14].

At the same time, cross-border customs clearance requires the submission of more than ten types of standardized documents. Since reporting requirements and review standards vary from country to country, and small and micro enterprises in rural counties generally do not have dedicated customs clearance personnel, omissions in documentation or errors in reporting can easily lead to fines and prolonged cargo delays. This further exacerbates the pressure from product spoilage and tied-up capital, significantly reducing the efficiency of cross-border agricultural product circulation.

3.5. Significant Shortage of Multidisciplinary Professionals and Insufficient Industry Empowerment

Cross-border e-commerce for agricultural products is a multidisciplinary emerging business model that requires practitioners to possess multiple professional competencies, including knowledge of agricultural production standards, overseas platform operations, cross-cultural content dissemination, international trade compliance, and cross-border supply chain management. Such high-end, multidisciplinary talent is primarily concentrated in major first-tier cities. County-level areas lack competitiveness in terms of salary, career development opportunities, and professional platforms, resulting in significant shortcomings across the entire talent recruitment, cultivation, and retention chain, and a pronounced imbalance between talent supply and demand.

Currently, most practitioners in county-level areas are proficient only in basic operations such as listing products in online stores and processing orders. They lack advanced professional skills in areas such as long-term brand management, analysis of international regulations, refined content creation for overseas markets, and risk management, making it difficult to support the industry's transition toward high-end, branded, and international development. At the same time, the curriculum offerings at local colleges and universities in these counties are out of step with the industry's actual development needs; practical training facilities are inadequate; and social training programs cover only basic introductory content, lacking advanced courses such as multilingual operations and specialized overseas compliance training. This underdeveloped industrial ecosystem further exacerbates talent drain, creating a vicious cycle of "talent shortage—industrial stagnation—talent drain," which has become a core soft bottleneck constraining industrial upgrading.

3.6. Low Suitability of Cross-Border Financial Services and Insufficient Funding for Industrial Upgrading

Initiatives such as standardizing industrial chains, promoting brands overseas, obtaining international compliance certifications, and upgrading cold-chain infrastructure all require sustained medium- to long-term capital investment. However, the current financial service system tailored to county-level agriculture-related cross-border industries remains underdeveloped. High financing barriers, a scarcity of risk hedging tools, and cumbersome procedures for implementing policy subsidies severely constrain enterprises' transformation and upgrading. Most county-level agriculture-related cooperatives and small and medium-sized processing enterprises operate on a light-asset model. They lack real estate collateral, and the credit reporting system is underdeveloped, making it difficult for them to obtain traditional credit support. At the same time, traditional foreign trade credit products are designed for large-volume, long-term traditional orders and are incompatible with the small-amount, high-frequency, and fragmented transaction models of cross-border e-commerce, resulting in a structural imbalance between the supply and demand for capital.

The export of fresh agricultural products faces multiple operational risks, including product spoilage, overseas rejection, and exchange rate fluctuations. However, export credit insurance coverage in rural counties is limited, and the available insurance products are poorly suited to these needs. Enterprises face significant pressure to bear insurance premiums, and most small and medium-sized merchants have not implemented exchange rate hedging tools; even minor exchange rate fluctuations can erode their meager operating profits. Furthermore, cross-border e-commerce support subsidies across various regions generally have high application thresholds and lengthy approval processes. Policy resources are heavily skewed toward leading large enterprises, making it difficult for micro and small businesses to meet the eligibility criteria. As a result, a significant portion of policy benefits remains unrealized, while enterprises face increasing pressure from tied-up capital, leaving them unable to invest in long-term industrial upgrading and innovation.

The six constraints mentioned above do not exist in isolation but form a closed-loop negative feedback mechanism: talent shortages directly lead to deficiencies in operational, compliance, and marketing capabilities, increasing operational losses and squeezing corporate profit margins; Limited corporate profits leave businesses unable to invest in upgrade projects such as cold-chain infrastructure, traceability systems, and brand building, further exacerbating shortcomings in hardware infrastructure; high logistics costs and the lack of brand premium on products continue to depress industry profits, which in turn leads to talent drain and insufficient investment in the sector. Taking the cross-border export of fresh agricultural products as an example, the lack of cold-chain infrastructure drives up

transportation costs, forcing companies to cut budgets for compliance testing—which can easily lead to issues such as shipments being rejected at ports of entry and a decline in overseas reputation. Ultimately, this entrenches the industry’s developmental dilemma of “low-price, high-volume sales; inability to upgrade; and entrenchment in the low-end market,” creating an urgent need for systemic optimization through a collaborative governance model across the entire supply chain.

4. Comprehensive Optimization System for Cross-Border E-Commerce of County-Level Specialty Agricultural Products

In response to the systemic development challenges arising from the interplay of multidimensional weaknesses across the industrial chain, this paper rejects the fragmented governance approach of addressing isolated stages. Drawing on the theory of global value chain upgrading, it constructs a four-party collaborative governance framework characterized by “government guidance, platform empowerment, market-driven leadership, and association coordination.” By advancing comprehensive upgrades across three dimensions—optimization of distribution processes, product quality enhancement, and expansion of industrial functions—it aims to address the industry’s developmental shortcomings and transform local agricultural resource advantages into stable, sustainable competitive advantages in the international market.

4.1. Overall Implementation Logic and Top-Level Design

With the advancement of the global value chain as the central focus, three major optimization directions are identified: First, upgrading distribution processes by restructuring the cross-border supply chain system, reducing transportation losses and overall operating costs, and enhancing the efficiency of cross-border distribution; Second, upgrading product tiers by comprehensively advancing standardized production and deep processing, optimizing product quality and international compliance capabilities, and breaking through market access barriers in overseas markets; third, upgrading industrial functions by expanding into high-value-added areas such as independent brand operations and refined overseas marketing, thereby breaking free from the cycle of low-price competition.

A four-party collaborative implementation framework has been established: the government is responsible for top-level industrial planning, infrastructure investment, the implementation of supporting policies, and the provision of public services; cross-border platforms provide traffic resources, digital operational tools, and standardized operational solutions; agribusinesses focus on advancing product iteration, quality upgrades, and the cultivation of proprietary brands; and industry associations coordinate the formulation of industry standards, government-enterprise liaison, and industry self-regulation. Through coordinated

efforts and aligned actions among these four parties, the overall quality and level of the industry will be elevated.

4.2. Implementation and Optimization Measures Across Seven Dimensions

4.2.1. Upgrading Cross-Border Supply Chains and Cold Chain Systems

Focusing on the three key pain points—gaps in the cold chain at the point of origin, insufficient international transport capacity, and low levels of digitization—we will build an efficient, low-cost, and low-waste cross-border fulfillment network by addressing infrastructure shortcomings, intensively integrating resources, and leveraging digital technologies. The government will establish a special cold-chain support fund to attract private capital for project development. It will deploy field pre-cooling facilities, smart sorting centers, and centralized refrigerated distribution hubs in key agricultural regions to build an integrated, forward-deployed cold-chain service network at the production source. Organized around county-level industrial clusters, the government will promote the joint construction and shared use of cold-chain warehousing facilities to avoid duplicate construction and enhance resource utilization efficiency.

Consolidate scattered county-level export orders, coordinate unified negotiations with leading logistics companies to sign long-term strategic cooperation agreements, and launch dedicated cross-border transport routes for agricultural products to stabilize transport capacity and reduce transportation costs. Establish public overseas warehouses in key overseas consumer markets such as Southeast Asia and Central Asia, adopting an operational model of centralized domestic stockpiling and local overseas distribution to significantly shorten delivery cycles and spread out per-unit logistics costs [7]. Leverage blockchain and Internet of Things (IoT) technologies to build a comprehensive cross-border traceability platform, integrating data interfaces across the entire process—from cultivation, processing, and warehousing to transportation and customs clearance—to enable end-to-end visual tracking of goods; simultaneously interface with customs and overseas regulatory systems to achieve data interoperability and mutual recognition, thereby reducing the costs associated with duplicate inspections and document filings and improving the overall efficiency of customs clearance and distribution.

4.2.2. Establishment of a Dual-Track Brand Development System

To address issues such as brand fragmentation, weak pricing power, and poor adaptability to cross-cultural communication, a “regional public brand + enterprise private brand” dual-drive development model is implemented to systematically advance the overseas brand layout through cluster-based initiatives. Industry associations will take the lead in formulating unified regulations for public brand quality control, authorized use, and exit supervision. Strict brand admission reviews will be conducted to eliminate malpractices such as passing off inferior products as

superior ones and low-price dumping, thereby safeguarding the reputation of regional agricultural products in overseas markets. High-quality enterprises within the county will be organized to jointly participate in overseas trade shows and brand zones on cross-border platforms, collectively enhancing the overseas recognition of the county's distinctive agricultural products.

The government will collaborate with professional marketing service agencies to provide small and medium-sized businesses with free, one-stop services, including brand positioning, overseas trademark registration, and cross-cultural content planning. We will deeply explore the core differentiating values of local ecological resources, traditional farming customs, and intangible cultural heritage processing techniques, and build emotional connections by aligning with the aesthetic preferences and cognitive logic of overseas audiences, thereby breaking free from the dilemma of homogenized promotion. Implement a tiered channel strategy based on product positioning: premium gift sets and organic products will be placed in high-end overseas supermarkets, while affordable specialty items will focus on regional online platforms. Simultaneously, new models such as cross-border live streaming, influencer endorsements, and private domain operations on independent websites will be deployed to break free from the price war for low-cost traffic on platforms and achieve long-term brand value appreciation.

4.2.3. Building a Full-Chain International Compliance Empowerment System

Addressing the three major pain points—discrepancies between domestic and international standards, high costs of international certification, and lack of interoperability in cross-border traceability—we have established a three-dimensional compliance support mechanism comprising “proactive risk early warning, unified cluster certification, and digital credentials.” Multiple departments, including commerce, agriculture, and customs, have jointly established a county-level cross-border compliance public service platform. This platform provides real-time updates on agricultural product market access standards, testing specifications, and labeling requirements for various countries, complemented by AI-powered self-assessment tools to help enterprises proactively avoid inspection risks and reduce compliance-related losses.

Using county-level industrial clusters as the unit of operation, we have uniformly aligned with internationally recognized standards such as GlobalGAP and HACCP. The government has allocated special certification subsidies to support leading enterprises in obtaining high-end international certifications first, using these as models to drive standardized transformation across the entire industry and open up access to high-end overseas markets. Iteratively upgrade the blockchain traceability system to fill gaps in data modules for cross-border circulation and overseas customs clearance. Integrate with international third-party testing agencies such as SGS and BV to generate globally recognized compliance certificates, enabling “one test, mutual recognition across multiple countries.” This will significantly reduce

enterprises' costs associated with repetitive testing and enhance the international compatibility of products.

4.2.4. Optimization of Port Clearance Facilitation Mechanisms

To address the core requirement of timeliness for fresh agricultural products, we will simplify customs declaration procedures, reduce port dwell times, and minimize product wastage through three approaches: port upgrades, pre-shipment supervision, and international mutual recognition. We strictly implement the “green channel” policy for fresh agricultural products, fully promote advance declaration, two-step declaration, and contactless inspection models, and leverage the Single Window for International Trade platform to enable data to be entered once and reused across multiple stages, thereby streamlining paper documentation and significantly reducing port dwell times.

By establishing bonded warehouses and pre-clearance inspection points in key agricultural production areas, inspection and supervision processes are moved to the point of origin, creating an efficient model of “supervision at the source and rapid release at the port.” After implementing this model in Wugong, Shaanxi, the cross-border customs clearance cycle for agricultural products was significantly shortened, and clearance efficiency was greatly improved [4]. Leveraging regional trade agreements such as the RCEP, we will actively promote multilateral mutual recognition of agricultural product quarantine, traceability, and certificates of origin to reduce redundant testing and review procedures, thereby comprehensively optimizing customs clearance service processes.

4.2.5. Cultivating a Tiered, Multidisciplinary Talent Training Mechanism

Through a three-pronged development approach—flexible talent recruitment, local talent cultivation, and industry-based talent retention—we will comprehensively address the shortage of cross-border talent in county-level areas. Establish a county-level industry expert think tank and, through flexible collaboration methods such as project partnerships, short-term on-site assignments, and technical guidance, attract high-level talent in areas such as cross-border compliance, brand marketing, and supply chain management to reduce talent recruitment and employment costs for small, medium, and micro enterprises. Deepen tripartite cooperation among government, academia, and industry to jointly build cross-border e-commerce training bases, offering specialized courses in cross-border platform operations, cross-cultural communication, international trade compliance, and operations in less-commonly taught languages.

Implement tiered and categorized hands-on training: provide advanced training for business leaders in areas such as industrial strategic planning, global brand expansion, and compliance and risk management; and offer basic practical training for frontline staff in store operations, live-streaming sales, and customs documentation, thereby rapidly addressing gaps in the professional capabilities of

local teams. Improve the supporting system for entrepreneurship at the county level by introducing favorable policies such as housing subsidies, rent reductions, and startup support. Broaden career development pathways for talent, increase talent retention rates, and solidify the talent foundation for industrial development.

4.2.6. Building a Diversified Cross-Border Financial Support System

Deepen collaboration between banks and enterprises as well as between banks and industry associations. Leverage cross-border orders, warehouse documents, and customs declaration data to enhance corporate creditworthiness. Introduce specialized financial products such as unsecured online credit loans and accounts receivable financing to address the difficulties and high costs of financing faced by small and medium-sized agribusinesses. Establish a credit risk compensation pool to share the lending risks borne by financial institutions, thereby further reducing enterprises' financing costs.

Promote diversified risk-sharing products and develop specialized insurance products tailored to cover losses from perishable goods, overseas rejection of shipments, and exchange rate fluctuations; provide full or partial premium subsidies to micro and small enterprises. Popularize exchange rate hedging tools such as forward foreign exchange contracts and exchange rate locking, optimize multi-currency cross-border settlement channels, and shorten enterprises' cash collection cycles. Adjust the focus of policy subsidies to prioritize core areas such as cold-chain infrastructure upgrades, international compliance certification, and overseas brand promotion; simplify online application processes and accelerate fund disbursement to ensure that micro and small enterprises fully benefit from policy incentives.

4.2.7. Exemplary County-Level Practice Cases

Wugong County in Shaanxi, as a typical representative of inland counties in central and western China, has addressed its inherent weakness of limited supporting resources by establishing a county-wide industrial support system centered on government coordination. By leveraging the county's dedicated bonded warehouse in conjunction with a multimodal transport system, it has thoroughly resolved the two core pain points of logistics delays and cumbersome customs clearance; it has integrated public resources such as customs clearance, finance, and talent training to create a one-stop cross-border public service platform, thereby reducing enterprises' independent operating costs; it has guided local industries to band together for overseas expansion, addressing the shortcomings of scattered resources and insufficient professional capabilities among individual merchants, and providing a replicable and scalable practical model for the development of cross-border e-commerce for agricultural products in counties in central and western China.

Anxi County in Fujian, a benchmark for industrial clusters in eastern China, has

leveraged its mature tea industry foundation to vigorously advance industrial digitalization and brand upgrading. It has established an integrated regulatory system combining standardized quality control with digital traceability to ensure full-process compliance and control over products; integrated overseas warehouses and cross-border logistics resources to build a stable and efficient fulfillment service chain; and simultaneously operated regional public brands alongside corporate proprietary brands to drive the industry's transition from a low-end raw material export model to a high-value-added, branded export model, thereby providing a high-quality practical model for the cross-border upgrading of distinctive industries in mature counties in eastern China.

5. Conclusion

In the era of the digital economy, cross-border e-commerce for distinctive agricultural products from county-level regions possesses vast market potential and development prospects. It serves as a key lever for revitalizing local agricultural resources, promoting rural industrial revitalization, and facilitating the dual circulation pattern between domestic and international markets. Currently, the industry faces six major bottlenecks—cold-chain logistics, port clearance, international compliance, brand management, specialized talent, and cross-border finance—which constrain and reinforce one another, forming a systemic negative cycle that is difficult to break through at any single point. Among these, logistics and customs clearance represent superficial distribution barriers; international compliance is a mandatory threshold for accessing overseas markets; weak branding is the core reason for the industry's low added value; talent shortages constitute a fundamental soft constraint on industrial upgrading; and inadequate financial support has long hindered industrial iteration and innovative development.

The deep-seated contradictions in the industry's development are primarily manifested in a structural imbalance between the traditional, fragmented smallholder farming model and the high-end operational demands of cross-border e-commerce—namely, globalization, standardization, and branding. Relying solely on individual enterprises to make independent adjustments or implement isolated corrective measures will not achieve comprehensive industrial transformation and upgrading. Only by establishing a four-party collaborative governance system involving the government, online platforms, industry associations, and agribusinesses—using industrial clusters as a vehicle and digital transformation as a lever—can we comprehensively address shortcomings across the entire industrial chain and build a collaborative and symbiotic industrial ecosystem. This is the only way to transform the advantages of local agricultural resources into stable and sustainable competitiveness in the international market, propelling the industry from an extensive model of low-price, high-volume production toward high-quality

development characterized by branding, premium products, and high value-added. Based on the conclusions of this study, this paper proposes three-tiered implementation recommendations. First, at the planning level, we must adhere to a differentiated approach. Building on local resource endowments, we should select distinctive products that are high-value-added, easy to store and transport, and aligned with mainstream overseas consumer demand. We should focus on building competitive advantages in specific market segments, precisely match overseas markets and distribution channels based on regional location, avoid homogeneous low-price competition, and pursue a development path characterized by clustering and premium products. Second, at the implementation level, a phased and gradual approach should be adopted. In the first phase, priority should be given to improving basic supporting infrastructure—such as cold-chain warehousing, port customs clearance, and public compliance systems—to lay a solid foundation for industrial development. In the second phase, efforts should focus on advancing production standardization, implementing traceability systems, and cultivating local talent to address shortcomings in the industry’s mid-tier development. In the third phase, the focus should shift to deepening overseas brand building and refined cross-cultural marketing to penetrate the mid-to-high-end consumer market and achieve a leap in industrial value. Third, at the support level, we will establish a long-term, collaborative industrial ecosystem. We will integrate public resources to create a one-stop cross-border public service platform, transforming the compliance, logistics, and marketing costs currently borne individually by enterprises into shared cluster costs; cultivate leading local “chain-leading” enterprises and improve mechanisms for coordinated development across the supply chain; and optimize fiscal and financial support policies to precisely target small and micro-enterprises. Through stable policy support, we will help mitigate fluctuations in the cross-border market and underpin the long-term, high-quality development of county-level agricultural product cross-border e-commerce.

Acknowledgements

Funding: Zhaoqing University Institutional Research Project (No.: bqW202602).

References

- [1] Xun Y.H., Tang Z., Meng X.. Analysis of Development Pathways for Agricultural E-commerce and Cross-border E-commerce Based on the TOE [J]. *Agricultural Economy*, 2024(11):138-140.
- [2] Fan Y.W. A Study on the High-Quality Development of Cross-border E-commerce for Agricultural Products from the Perspective of Digital Rural Development [J]. *Agricultural Economics*, 2023(12):135-137.
- [3] Bai Y.T, Wu Y. ch on Brand Building Strategy of Cross border Ecommerce of Agricultural Products under the Background of Rural Revitalization ——Taking Hubei Zigui Navel Orange as an Examl [J]. *Northern Economy and Trade*, 2024(01):16-19.
- [4] Chen W. A Study on Export Models and Pathways for Cross-Border E-Commerce of Agricultural Products in the Context of Rural Revitalization [J]. *Market Modernization*,

- 2026 (16): 39-41.
- [5] Lu G.H., Zhou D. A Study on the “Four-Chain” Integration Pathway for Cultivating Guangdong’s Digital “New Farmers” Driven by Cross-Border E-Commerce Industrial Clusters [J]. Shanxi Agricultural Economy, 2026(17):203-207.
 - [6] Jiang X.J., Li Mulan. A Study on the Pathways for the Coordinated Development of Cross-Border E-Commerce and Agricultural Product Supply Chains under the RCEP Framework [J]. Rural Economy and Science-Technology, 2025, 36(17):219-222.
 - [7] Zou H.L., Liang Haijun. Empowering Rural Revitalization through Cross Border E-Commerce of Agricultural Products:Basic Conditions, Realistic Dilemmas, and Promotion Strategy: A Case Study of Guangxi [J]. Journal of Guangxi Agriculture, 2024, 39(01): 47–54.
 - [8] Li C.X Research on fresh agricultural products cross-border e-commerce supply chain coordination management strategies [J]. China Circulation Economy Logistics Technology, 2022, (25): 11–14.
 - [9] Chen K.D., Wu B.Y. A Study on Optimizing the Commercialization Pathways for Guizhou’s Specialty Agricultural Products in the Context of “Qianhuo Chuhai” [J]. China Economic & Trade Herald, 2026(06): 104–106.
 - [10] Jiang W.H. Liu Qing. Focusing on the Coordinated Development of the “Three Teas,” Anxi County in Fujian Sets the Highest Standard Among Tea-Producing Counties [EB/OL], <http://fj.people.com.cn/n2/2024/0926/c181466-40990395.html>,2024-09-26.
 - [11] Publicity and Education Center. Wugong County: “E-commerce Sounds the Call” to Mobilize Efforts; “Departments Step Up” to Resolve Concerns [EB/OL]. https://sndrc.shaanxi.gov.cn/sy/xwxx/sqfgdt/202506/t20250612_3530708.html,2025-0-16.
 - [12] Zhai S.X, Peng Chao. Achievements, Bottlenecks, and Development Recommendations for Agricultural Product Cold Chain Construction [EB/OL], https://scs.moa.gov.cn/ccl/mtbd/202208/t20220831_6412758.htm,2022-08-31.
 - [13] Feng Xuebin, Yu Miao, Zhang Jianying. “A Study on the Integration and Coordination of China’s Agricultural Product Cross-Border E-Commerce under the ‘Belt and Road’ Initiative” [J]. Journal of Commercial Economics,2021(20):147–150.
 - [14] Li Q.G. “Practical Challenges and Pathway Optimization for Cross-Border E-Commerce in Empowering the Overseas Expansion of Fresh Agricultural Products” [J].Reformation & Strategy, 2026, 42(04): 125–129.