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Research on the Development Issues and Measures of China's Vegetable Foreign Trade under the Background of the "Belt and Road Initiative

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Abstract

As China continues to advance the "Belt and Road Initiative," this study employs comparative analysis, empirical analysis, and normative analysis to reveal that China's vegetable export trade exhibits high concentration and a continuously expanding scale, reflecting the current state of industrial complementarity with "Belt and Road" countries . It also identifies challenges in China's development, including high logistics and transportation costs for vegetable exports, trade barriers and quality and safety issues, high concentration in vegetable foreign trade leading to significant risks, and the impact of external conditions on vegetable exports. The study proposes measures to improve domestic logistics and transportation technology, promote the establishment of unified quality inspection standards, advance regional comprehensive cooperation, mitigate the impact of trade barriers, expand international supply chain channels, and guard against external risks. By seizing the opportunities presented by the "Belt and Road" Initiative, China's vegetable foreign trade can be driven toward broader scope, wider fields, and deeper levels of development.

Keywords

Belt and Road Initiative; Vegetables; Foreign Trade; Exports.

1. Introduction

Since 2013, General Secretary has advocated for the development of "Belt and Road" trade to promote the building of a community with a shared future for mankind and strengthen economic ties among countries along the routes. Centered on the "Silk Road Economic Belt" and the "21st-Century Maritime Silk Road," this strategy is dedicated to advancing regional cooperation, connectivity, and shared development. [3] Its objectives extend beyond driving China's own economic growth to assisting participating nations in elevating their overall development levels through a model of win-win cooperation.

As the Belt and Road Initiative has been implemented in greater depth, agricultural cooperation between China-a major agricultural power-and other nations has continued to strengthen [4].As one of the core products, vegetable exports have achieved significant results under China's Belt and Road Initiative. According to data from the Ministry of Agriculture and Rural Affairs, vegetable exports accounted for 18.74% of China's total agricultural exports in 2023, making them a mainstay of agricultural exports, with over 50% of these exports destined for countries along the Belt and Road routes.Against the backdrop of the Belt and Road Initiative, as the global economic landscape grows increasingly complex, China's vegetable industry faces not only vast development opportunities but also significant challenges. How to effectively leverage these opportunities across multiple sectors while addressing the immense challenges of international competition has become a new focal point.

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2. Analysis of the Current Status of China's Vegetable Industry Foreign Trade Development under the Background of "Belt and Road"

2.1. High Trade Concentration with Regional Asymmetry

China's vegetable trade exhibits a high degree of concentration, primarily focused on "Belt and Road" countries in the East Asia and Pacific region [6]. Southeast Asian nations, with their advantageous geographical locations and proximity to China, facilitate the development of trade relations. Driven by the "Belt and Road" initiative, ongoing improvements in infrastructure connectivity and trade facilitation measures have further promoted vegetable trade cooperation between China and these regions [1].

As of 2023, China's total vegetable foreign trade volume reached $167.041 billion. The East Asia and Pacific region was the primary trade area, with a total import and export value of $53.383 billion, accounting for 31.96% of the total. Exports amounted to $18.146 billion, while imports reached $35.236 billion, resulting in a significant trade deficit. This indicates that the region serves as both a key export market and a major source of specialty and off-season vegetables.

In terms of import and export structure, China's vegetable export market is relatively dispersed, with East Asia and the Pacific accounting for only 1.51% of total exports, as enterprises are expanding into broader markets. Imports, however, exhibit a high degree of concentration, with the three major source regions-Latin America, East Asia and the Pacific, and North America-combined accounting for approximately two-thirds of total imports, exposing the country to certain supply chain risks [5].

Table 1. Global trade in vegetables between China and foreign countries

Name of trading partner	Value of exports (thousands of US dollars)	Value of imports (thousands of US dollars)	Total value of imports and exports (thousands of US dollars)	world share of total import and export	Export share (%)	Imported products share (%)
East Asia and the Pacific region	18146171.52	35236383.76	53382555.28	0.319577585	1.51	3.47
Europe and Central Asia	5969054.49	12096352.37	18065406.86	0.108149546	0.73	2.28
Latin America and the Caribbean	1002075.88	52807530.63	53809606.51	0.32213415	0.41	21.76
Middle East and North Africa	2165821.32	1086075.88	3251897.2	0.01946766	0.97	0.47
North America	3070939.52	28293473.15	31364412.67	0.187764771	0.56	13.53
South Asia	798937.56	1867629.34	2666566.9	0.015963548	0.54	9.36
Sub-Saharan Africa	858402.37	2501909.97	3360312.34	0.020116693	0.66	2.43
world	32468363.6	134572623.6	167040987.2	1	0.96	5.26

2.2. Trade Volume Continues to Expand

In recent years, China's vegetable exports have generally maintained a growth trend[7]. As of 2022, the country's vegetable export volume reached 10.5555 million tons, a year-on-year increase of 6.25%; export value stood at $15.601 billion, a year-on-year increase of 8.34%[8]. Growth has been particularly pronounced in trade with countries along the Belt and Road.Taking Myanmar as an example, the value of China-Myanmar vegetable trade in 2024 increased by approximately 192.8% compared to 2020, reflecting the vitality and potential of

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bilateral agricultural cooperation [15].Over a longer timeframe, China's vegetable export value rose from $9.071 billion in 2013 to $32.46 billion in 2023, while its share of global vegetable exports increased from 13.13% to 16.09% [11]. During the same period, the total vegetable export value of countries along the Belt and Road route also grew from $21.512 billion to $28.549 billion.These figures indicate that China and the countries along the Belt and Road have jointly constituted a significant driving force behind the growth of global vegetable trade [10].

Looking at specific trading partners, between 2020 and 2024, China's vegetable trade with major BRI countries showed an overall upward trend, with total import and export value rising from $1.344 billion to $1.537 billion, representing an overall increase of 14.41%.Among them, countries such as South Korea, Vietnam, and India maintained steady growth, with trade volumes increasing by approximately 32.91% for South Korea and 7.31% for Vietnam; Myanmar performed particularly well, with a growth rate as high as 192.8%, becoming a highlight of regional agricultural cooperation [15]. Although trade volumes declined in individual countries such as North Korea and Singapore, this did not affect the overall upward trend.

Table 2. Comparison of vegetable import and export trade between China and major Belt and Road countries in 2020 and 2024 (unit: US dollars)

Name of trading partner	Total value of imports and exports in 2020	Total value of imports and exports in 2024	D-value	rate of rise
Burma	32,867,216	96,236,238	63,369,022	1.928031
Democratic People's Republic of Korea	9,761,025	193,028	-9,567,997	-0.98022
India	46,997,890	59,072,253	12,074,363	0.256913
Singapore	126,523,726	97,694,372	-28,829,354	-0.22786
Korea	289,745,264.00	385,110,857.00	95,365,593	0.329136
Vietnam	837,639,026	898,843,156	61,204,130	0.073067
totality	1,343,534,147	1,537,149,904	193,615,757	0.144109

China and the countries along the "Belt and Road" route are major players in the global vegetable trade, driving the development of the global vegetable trade.In 2013, China's total vegetable trade value was $9.071 billion, accounting for 13.13% of the world's total vegetable exports. From 2013 to 2022, China's vegetable trade generally showed an upward trend. Although it declined in 2020 due to the pandemic, it rebounded after the pandemic was brought under control. As of 2022, China's vegetable export value reached $15.601 billion, accounting for 16.09% of the global total [11].

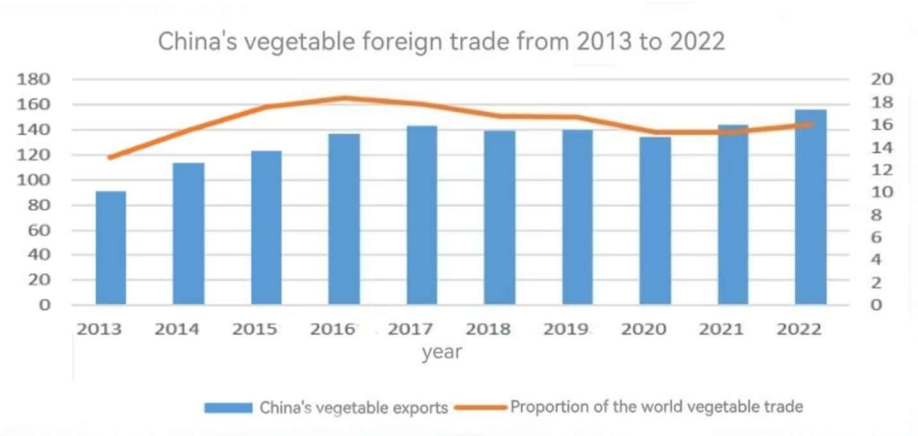

Fig. 1 China's Vegetable Export Value and Share of Global Vegetable Trade from 2013 to 2022

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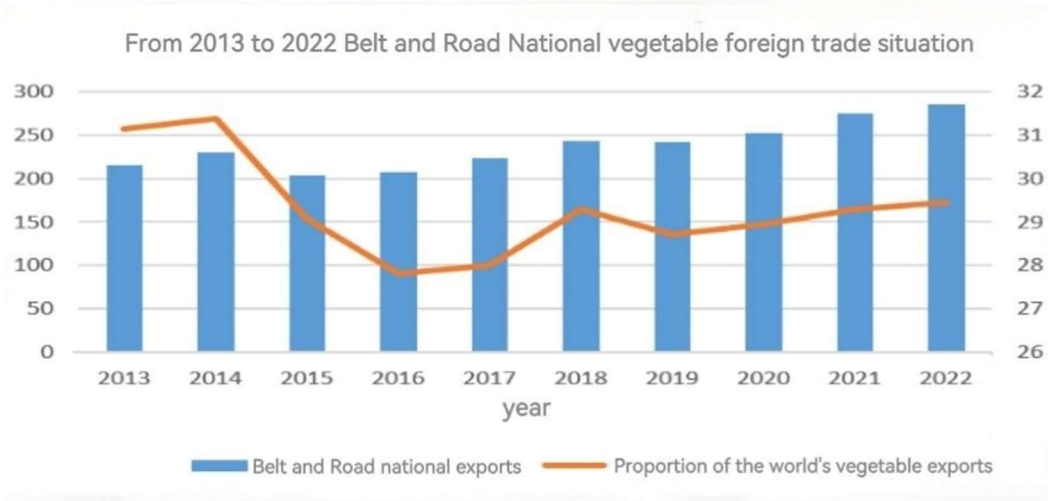

Fig. 2 Vegetable export value of Belt and Road countries and their share in world vegetable trade from 2013 to 2022

2.3. Trade Structure Gradually Optimizing, Exports of High-Value-Added Products Increasing

Alongside the expansion of export scale, China's vegetable export structure has also undergone positive changes [7]. Previously, exports were dominated by fresh vegetables and minimally processed products; in recent years, the proportion of higher-value-added products-such as processed vegetables, frozen vegetables, and organic vegetables-has gradually increased [8]. The market share of products like tomato paste, dehydrated vegetables, and frozen vegetables has continued to expand in markets such as Southeast Asia and the Middle East. This shift has not only enhanced the overall profitability of China's vegetable exports but also strengthened the industry's ability to withstand fluctuations in the international market [9].

2.4. China's Production Scale and Efficiency Complement Those of "Belt and Road" Countries

China boasts a rich variety of vegetable products, high production volumes, and a maximum cultivated area of 572.61 square meters-far exceeding that of other countries [12]. For major crops such as potatoes, sweet potatoes, and cucumbers, China's production scale is significantly larger than that of other nations. Comparing the production of major vegetables in China with representative "Belt and Road" countries in 2022, China's cultivated area for all major vegetable categories far exceeds that of other countries (with the exception of dried beans).and China leads in yield per unit area for sweet potatoes, dry beans, cucumbers and gherkins, eggplants, and spinach [14].

Overall, China has a large vegetable cultivation area, with yields for some vegetables at a moderate level, indicating a favorable geographical location for cultivation and high production volumes [12]. Other countries, such as Uzbekistan, have smaller cultivation areas but higher yields per unit area. For example, Uzbekistan's potato yield is 31.56 t/ha, far exceeding that of China (16.70) and other countries. In Malaysia:tomato yield is 92.18 t/ha, more than 1.5 times that of China; countries along the "Belt and Road" route possess different comparative advantages based on their natural geographical locations and produce different types of products [15].

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Table 3 Comparison of Cultivated Area and Yield per Unit Area for Various Vegetable Types Between China and "Belt and Road" Countries

Vegetable Type	China		Thailand		Myanmar		Vietnam		Singapore	
	Area (10,000 ha)	Yield per unit area (t/ha)	Area (10,000 ha)	Yield per unit area (t/ha)	Area (10,000 ha)	Yield per unit area (t/ha)	Area / 10,000 ha	Yield per unit area (t/ha)	Area / 10,000 ha	Yield per unit area (t/ha)
Potatoes	572.61	16.70	0.61	18.23	2.86	14.91	2.00	16.74	—	—
Sweet potato	215.73	21.71	—	—	0.67	9.32	8.58	11.37	0	1.82
Dried beans	73.41	1.77	11.67	0.76	286.07	0.93	12.33	1.21	—	—
Cucumbers and gherkins	131.15	58.95	1.89	9.39	—	—	—	—	—	—
Tomato	141.17	59.86	0.61	22.64	—	—	—	—	0	8/21
Eggplant	81.81	46.84	0.07	29.40	—	—	—	—	—	—
Spinach	73.24	41.87	—	—	—	—	—	—	0.01	20.74
Cauliflower and broccoli	48.84	19.78	0.12	12.19	—	—	0.90	20.13	—	—
Carrots and turnips	41.02	45.75	—	—	—	—	—	—	—	—
Pumpkins, Luffa, and Calabash	39.87	18.50	0.54	20.80	—	—	—	—	—	—

Types of Vegetables	Malaysia		Indonesia		Russia		Uzbekistan		Pakistan	
	Area (10,000 ha)	Yield per unit area/ (t/ha)	Area (10,000 ha)	Yield per unit area/ (t/ha)	Area / 10,000 ha	Yield per unit area/ (t/ha)	Area / 10,000 ha	Yield per unit area/ (t/ha)	Area (10,000 ha)	Yield per unit area/ (t/ha)
Potatoes	—	—	7.67	19.60	108.65	17.38	10.91	31.56	31.41	25.27
Sweet potato	0.26	16.90	4.74	18.44	—	—	—	—	0.16	8.63
Dried beans	—	—	10.43	0.94	0.72	1.43	—	—	22.48	0.62
Cucumbers and gherkins	0.50	20.46	4.14	10.73	3.65	44.81	2.75	32.90	0.36	31.41
Tomatoes	0.21	92.18	6.34	18.44	7.83	33.79	6.42	34.11	6.67	11.89
Eggplant	0.26	17.70	5.04	13.72	—	—	0.91	22.20	0.67	14.25
Spinach	0.65	12.31	4.71	3.63	—	—	—	—	0.68	12.71
Cauliflower and broccoli	—	—	1.51	12.72	0.19	11.79	—	—	1.14	24.31
Carrots and turnips	—	—	3.91	18.87	4.25	32.02	4.70	83.27	2.71	25.02
Pumpkins, cucumbers, and gourds	0.16	12.95	0.80	68.75	4.82	21.80	—	—	2.86	14.22

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3. Issues Facing China's Vegetable Exports in the Context of the Belt and Road Initiative

3.1. Logistics and Transportation Costs Driven by Geographical Factors

Vegetables are perishable agricultural products that require strict adherence to transportation timelines and optimal preservation conditions [5]. Currently, most "Belt and Road" countries are developing nations with inadequate infrastructure, making it difficult to establish robust transportation networks. Long-distance transport often results in prolonged transit times, multiple handling points, and high wastage [3]. For instance, when China exports vegetables to certain East Asian and Central Asian countries, they must undergo long-distance land transport. Insufficient cold chain support along the route makes it difficult to preserve the vegetables, directly affecting their quality and marketability [4].This places higher demands on China's transportation infrastructure and speed, and to some extent undermines the price and quality competitiveness of Chinese vegetables in the international market [10].

3.2. Trade Barriers and Quality and Safety Inspection Issues

As China continues to develop, some countries, such as the United States and Japan, have imposed high trade barriers on China, restricting the development of China's vegetable industry on grounds of substandard quality and pesticide residues, which has made it more difficult for the industry to grow. Among the countries along the "Belt and Road" route, due to the large number of nations involved and the differences in trade standards and policies across these countries, it is difficult for China to maintain a balanced approach to these standards.Some countries maintain high trade barriers for imported vegetables, such as extremely strict standards for agricultural residues, which significantly increase the labor, material, and financial costs of Chinese exports and restrict the export of Chinese vegetables.

Differences in vegetable quality testing standards across countries also pose challenges for trade. Some countries prioritize taste and appearance, while others focus on nutritional value and pesticide residue issues. Unless Chinese enterprises enhance their competitive edge and fully understand the quality standards of different countries, it will be difficult for them to engage in foreign trade [6].

3.3. High Geographical Concentration in Vegetable Trade Increases Risks

As China's relations with countries along the Belt and Road route continue to strengthen, the risks associated with vegetable foreign trade are also intensifying [13]. China's vegetable exports are increasingly influenced by international relations and the global economic and political environment. Should domestic demand in these countries decline or the international economic environment become more complex and volatile, this would impact China's vegetable imports and exports, making it difficult for domestic vegetable producers to mitigate the risks of production uncertainty.

4. Measures to Address the Issues

4.1. Enhance Domestic Logistics and Transportation Technology, and Encourage the Establishment of Unified Quality Inspection Standards

Strengthen logistics cooperation with "Belt and Road" countries, implement diverse transportation methods to maximize efficiency, and support Chinese logistics firms such as SF Express in expanding their international operations [4]. Enhance domestic industrial technology to overcome technical barriers, increase R&D investment in chilled and fresh logistics, and reduce export challenges caused by substandard quality [3].

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Strengthen standardized production in the vegetable industry, raise farmers' awareness of quality and safety standards, promote green pest control technologies to reduce pesticide use, and ensure vegetable quality and safety [2]. Actively promote the standardization of vegetable quality inspection and trade standards with "Belt and Road" countries, establish corresponding regulations, and break down barriers caused by differing national quality inspection standards to foster the healthy development of the vegetable industry [14].

4.2. Promote Comprehensive Regional Cooperation and Mitigate the Impact of Trade Barriers

Strengthen communication and consultation on trade policies. Building on existing trade cooperation frameworks, China should further advance the implementation of measures such as tariff reductions. Additionally, it should intensify consultations with "Belt and Road" countries on trade regimes related to technology and services, further eliminate non-tariff barriers between China and these nations, mitigate the obstructive effects of trade barriers, and create a favorable institutional environment for Chinese vegetable exports.

4.3. Engage in In-depth Cooperation to Expand International Supply Chain Channels

Encourage enterprises to relocate their vegetable industries to "Belt and Road" countries, strengthen cooperation in the vegetable sector with these nations, and establish vegetable cultivation operations globally through overseas investment and land leasing.Strengthen cooperation with countries along the Belt and Road in areas such as vegetable industry R&D, variety improvement, and the formulation of quality standards. Jointly enhance the technological content and added value of the vegetable industry, launch transnational scientific research cooperation projects, and introduce and promote advanced vegetable cultivation technologies and management expertise. Achieve diversification and global distribution of vegetable production to reduce risks arising from dependence on any single country

By leveraging the geographical strengths and weaknesses of each country, export appropriate vegetable products based on the needs of different nations and regions, and strengthen the supply of vegetable products in accordance with demand [12]. As of 2024, China has signed 22 free trade agreements with 29 countries, accounting for approximately one-third of China's total trade volume. China must continue to promote vegetable trade with other major trading nations, establish sound trade relationships, and mitigate risks arising from trade concentration [`15].

4.4. Enhance Risk Assessment Capabilities

Timely release risk warning information related to vegetable trade, improve mechanisms for resolving trade disputes and emergencies, and provide stronger safeguards for China's vegetable exports. Strengthen infrastructure at logistics hubs for vegetable imports and exports, improve international logistics channels, and deepen investment and trade cooperation with countries along the Belt and Road to enhance the capacity to jointly address risks in the international vegetable market [8].

5. Conclusion and Policy

Over the past decade since the implementation of the Belt and Road Initiative, significant achievements have been made in promoting infrastructure connectivity, trade and investment facilitation, and coordinated industrial development among countries along the route, creating historic opportunities for China's vegetable foreign trade. China's vegetable exports have continued to grow in scale, with a gradually optimized structure and deepening complementary cooperation with countries along the Belt and Road. However, challenges remain, including

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persistently high logistics and transportation costs constrained by geographical distance and infrastructure conditions; complex and diverse trade barriers influenced by differences in countries' geographical locations, industrial development levels, and quality standards; excessive concentration in export markets; and supply-side geopolitical risks stemming from uncertainties in the external environment. These issues require multi-level measures to address them.

First, we must develop geographically based cross-border logistics systems with other countries along the Belt and Road. By integrating the geographical characteristics and infrastructure conditions of different regions along the Belt and Road, we should establish a networked transportation system. For Southeast Asian countries, we should strengthen the development of maritime cold-chain logistics corridors; for Central Asian countries, we should improve cross-border rail transport and port cold-chain facilities; and for European countries, we should enhance the fresh produce transport capacity of the China-Europe Railway Express.

Second, for geographically adjacent countries with close trade ties, we should take the lead in promoting the mutual recognition of inspection and quarantine standards and cooperation on quality supervision. We should establish a vegetable quality and safety cooperation mechanism under the China-ASEAN Free Trade Area framework and promote the improvement of agricultural product standards within the Central Asian Regional Economic Cooperation Organization. We should improve the policy support system and promote the liberalization and facilitation of vegetable trade through measures such as signing trade agreements and reducing tariffs and non-tariff barriers.

Third, implement a differentiated geographic market strategy to strengthen the protection of products with geographical indications and the development of regional brands. While consolidating markets in key countries along the Belt and Road, actively expand into emerging geographic markets such as Central Asia, Central and Eastern Europe, and Africa. Based on the distinctive geographical environments and cultivation traditions of different production regions in China, cultivate vegetable varieties with geographical indications. Develop market-oriented vegetable varieties and processed products tailored to the climatic characteristics, consumption habits, and trade conditions of different geographical regions. Focus on diversifying market to avoid over-reliance on any single geographical region.

Fourth, we must enhance technological innovation capabilities and increase scientific and technological investment in the vegetable industry chain. We will focus on breakthroughs in key technologies such as cold-chain logistics, green production, and deep processing to increase the industry's value-added and international competitiveness.

Fifth, establish a comprehensive risk early-warning mechanism. Integrate geographical data, logistics channel information, and market distribution maps from countries along the Belt and Road to build a geographic information system for vegetable trade. Monitor climate changes, logistics conditions, and policy shifts in key regions in real time, issue early warnings of potential risks, and provide data support for decision-making by enterprises and governments.

As the Belt and Road Initiative progresses, China's vegetable industry should continue to uphold the principles of openness, cooperation, mutual benefit, and win-win outcomes. We must continuously optimize trade structures, improve product quality, and deepen international cooperation to foster a safer, more efficient, and more inclusive global vegetable supply chain. While advancing China's agricultural modernization and rural revitalization, we will also make greater contributions to food security and agricultural development in countries along the Belt and Road, jointly writing a new chapter in agricultural cooperation under the initiative.

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