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Research on China-ASEAN Industrial Chain Cooperation Models and Pathways to Enhance Resilience

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Abstract: With the accelerated reconstruction of the global industrial chain and the in-depth development of regional economic integration, the industrial chain cooperation between China and ASEAN is transforming from traditional processing trade to regional value chain division of labor. This article systematically reviews the current situation and main models of China-Asean industrial chain cooperation, deeply analyzes the pain points existing in the current cooperation such as low-end lock-in, logistics bottlenecks, uneven digitalization and geopolitical risks, and combines typical cases such as the China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity project, proposing resilience enhancement paths such as building high value-added industrial chains, promoting digitalization of supply chains, strengthening Singapore's hub function, improving risk hedging mechanisms, and promoting mutual recognition of standards. Research suggests that deepening the industrial chain synergy between China and ASEAN is not only an inevitable choice in response to the global supply chain restructuring, but also a key support for building a new regional economic pattern.

Keywords: China-ASEAN; industrial chain cooperation; regional value chain; supply chain resilience; China-Singapore Connectivity Initiative

Introduction

The global industrial chain is currently undergoing profound restructuring. US-China trade frictions, the impact of the COVID-19 pandemic, and geopolitical dynamics have elevated the security and resilience of industrial chains to a focal point of international attention. Against this backdrop, China-ASEAN industrial chain cooperation has reached an unprecedented level of closeness. Since the full launch of the China-ASEAN Free Trade Area in 2010, bilateral trade has continued to grow, reaching $911.7 billion in 2023. China has maintained its position as ASEAN's largest trading partner for 15 consecutive years, while ASEAN has been China's top trading partner for four consecutive years. However, behind this expansion, issues such as a singular cooperation model, low value-added activities, and the transmission of external risks have become increasingly prominent.

How to optimize cooperation models and enhance industrial chain resilience has emerged as an urgent challenge for deepening China-ASEAN economic and trade collaboration. This article will begin by examining the current state of cooperation, analyze the main models and pain points, and explore viable pathways for enhancing resilience.

1. China-ASEAN Industrial Chain Cooperation Status

China-ASEAN industrial chain cooperation has developed a multi-tiered and broad-based structure. In terms of industrial composition, electronics manufacturing, new energy, consumer goods processing, and cross-border logistics form the four major pillars. In electronics manufacturing, Penang, Malaysia, known as the "Silicon Valley of the East," hosts packaging and testing facilities for global giants like Intel and AMD, while China provides upstream chip design, materials, and midstream module manufacturing support. With Singapore as a headquarters hub, multinational corporations deploy packaging and testing in Malaysia and the Philippines, and final assembly in Vietnam and Thailand, creating a typical division of labor characterized by "Chinese technology + Southeast Asian manufacturing." The new energy sector has emerged rapidly in recent years, with Chinese photovoltaic and lithium battery companies expanding significantly in ASEAN. LONGi Green Energy and Trina Solar have established factories in Vietnam, while CATL has invested in battery projects in Indonesia, leveraging ASEAN's raw material advantages and tariff preferences for exports to Europe and the United States. In consumer goods processing, Vietnam's textile and garment industry and Cambodia's footwear sector heavily rely on Chinese fabric and accessory supplies, forming a traditional chain of "Chinese raw materials + ASEAN processing + Euro-American consumption." Logistically, Singapore, with its world-class port and Changi Airport, serves as a regional supply chain coordination center. After the launch of the China-Laos railway, the land transport corridor between China and the Indochina Peninsula has accelerated, positioning Kunming as a logistics hub facing ASEAN [1]. Spatially, Singapore plays a prominent hub role in regional supply chains. It not only offers globally leading port transshipment services but also dominates regional capital flows, information exchange, and high-end talent mobility through its mature financial services, legal framework, and multinational corporate headquarters. Chinese companies operating in ASEAN often establish regional headquarters in Singapore while dispersing manufacturing bases across Malaysia, Vietnam, and Thailand, creating a synergistic model of "Singapore hub + peripheral manufacturing."

2. Major Models of China-ASEAN Industrial Chain Cooperation

2.1 Processing Trade and OEM Division of Labor Model

This represents the most traditional and mature cooperation model. Chinese companies export semi-finished products or components to ASEAN countries, leveraging local labor cost advantages and tariff preferences to complete assembly and processing before re-exporting to European and American markets. A typical example is Vietnam's textile industry, where approximately 60% of fabrics and accessories are imported from China, with finished garments sold to the United States and the European Union. This model allows China to retain value-added benefits in the raw materials sector, while ASEAN gains employment and accumulates production capacity through processing. However, the drawback lies in both parties remaining in the middle segment of the smile curve with relatively low value addition, making them highly vulnerable to fluctuations in external demand.

2.2 Regional Value Chain Division of Labor Model

With China's industrial upgrading, cooperation has progressively evolved from simple original equipment manufacturing to a complex regional value chain. Its typical characteristics are: China undertakes technological research and development and core component manufacturing, ASEAN handles assembly and integration, while Singapore manages trade financing and global distribution. Taking the electronics industry as an example, China exports mobile phone chips and display screens to Vietnam, where complete units are assembled before being distributed globally through Singapore's logistics network [2]. This division of labor—"Chinese technology + ASEAN manufacturing + Singapore trade/finance"—has preliminarily achieved a gradient distribution of added

value within the region.

2.3 Cross-Border E-Commerce and Digital Supply Chain Models

In recent years, cross-border e-commerce has become a new highlight of China-ASEAN cooperation. The rise of platforms like Lazada and Shopee in Southeast Asia has enabled numerous Chinese sellers to directly reach ASEAN consumers through e-commerce channels. Companies such as Cainiao and JD Logistics are accelerating their deployment of overseas warehouses in ASEAN, establishing a digital supply chain system characterized by "Chinese warehouses + ASEAN overseas warehouses + local delivery." This model significantly reduces intermediate links, allowing small and medium-sized enterprises to participate in cross-border trade while promoting digital coordination in payments, logistics, and customs clearance.

2.4 Park Cooperation Model

Industrial parks have become crucial physical platforms for industrial chain clustering. Following the China-Singapore Suzhou Industrial Park, a model of China-Singapore cooperation, projects such as the China-Singapore Jilin Food Zone, China-Singapore Tianjin Eco-City, and the China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity have been successively established. Among these, the China-Singapore (Chongqing) project focuses on the "New International Land-Sea Trade Corridor," facilitating logistics and information flow connectivity between Western China and ASEAN. Additionally, industrial parks like the Thailand-China Rayong Industrial Zone and Longjiang Industrial Park, established by Chinese enterprises in Thailand, Vietnam, and Cambodia, have attracted numerous Chinese companies, forming a pattern of "collective overseas expansion and cluster development." These parks offer comprehensive supporting facilities and preferential policies, effectively reducing the operational risks for enterprises abroad.

3. Major Pain Points in Current Collaboration

3.1 Low-End Lock-in Risk in the Industrial Chain

In the current division of labor, China has shifted some of its export products to the mid-to-high end, while most ASEAN countries remain stuck in the processing and assembly stages, with weak local R&D and branding capabilities. If ASEAN relies on low-end contract manufacturing for the long term, it risks falling into the "immiserizing growth" trap; if Chinese companies fail to retain core production segments domestically, they may also face industrial hollowing-out due to technology spillovers.

3.2 High Logistics Costs and Inefficient Customs Clearance

ASEAN comprises ten member states with varying levels of infrastructure development. The land transport corridors in the Indochina Peninsula face discontinuities, where cumbersome customs clearance procedures and inconsistent inspection standards at certain ports lead to cargo delays. Estimates indicate that logistics costs from China to ASEAN are approximately twice those to Europe, constraining the flow of time-sensitive goods.

3.3 Uneven Digitalization Levels and Lack of Standardization

Singapore leads the world in digitalization, yet countries like Myanmar, Laos, and Cambodia have weak digital infrastructure, with mutual recognition of electronic documents and cross-border payment systems not yet fully established. Significant differences in cross-border data flow regulations among nations hinder the large-scale application of digital supply chains.

3.4 Rising Geopolitical and Policy Risks

ASEAN is a key target of the U.S. "Indo-Pacific Strategy" for courting support. Against the backdrop of intensifying China-U.S. rivalry, some ASEAN countries face growing pressure to "take sides" between major powers. Meanwhile, ASEAN nations frequently adjust their investment policies, with labor and environmental standards becoming increasingly stringent, leading to rising compliance costs for Chinese enterprises [3].

4. Optimization Pathways to Enhance Industrial Chain Resilience

4.1 Building High Value-Added Industrial Chains

Breaking away from low-end lock-in hinges on elevating the regional value chain. On one hand, Chinese enterprises should be encouraged to establish higher value-added segments in ASEAN, such as R&D centers, after-sales services, and brand operations, creating synergies with domestic operations. On

the other hand, local ASEAN companies should be supported to engage in technology-intensive industrial divisions of labor, enhancing local industrial capabilities through technology transfer and talent training. Key sectors like electronic information, new energy vehicles, and biomedicine should be prioritized to develop an upgrade path characterized by "R&D in China, transformation in ASEAN, and markets worldwide."

4.2 Promoting Digital Transformation of Supply Chains and Smart Logistics

Leverage digital technologies to remove blockages in regional supply chains. Accelerate the connection of the China-ASEAN Single Window, promote the mutual recognition of electronic certificates of origin and inspection and quarantine certificates. Support enterprises such as Cainiao and J&T in building an intelligent logistics network covering ASEAN, promote the models of overseas warehouses and forward warehouses, and realize the transition from "shipping from China" to "local stocking." Utilize blockchain technology to enhance the transparency of cross-border supply chains, ensuring the traceability of the entire process of goods flow, capital flow, and information flow.

4.3 Strengthening China-Singapore Connectivity as a Regional Hub

Singapore, with its highly developed financial system, efficient and convenient logistics network, and diverse pool of talent, has firmly established itself as the region's undisputed hub for finance, logistics, and human resources. To fully leverage its pivotal role, it can deeply rely on the important platform of the China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity. Seizing this opportunity, it can facilitate efficient connectivity between Western China and ASEAN through Singapore, breaking down geographical barriers and information gaps. Actively exploring a composite model of "Western China Manufacturing + Singapore Financing + ASEAN Assembly + Global Sales" will integrate the strengths of all parties, forming a complete industrial closed loop [4]. At the same time, strong support should be given to the construction of the China-Singapore Cross-Border Data Channel, enabling Singapore to serve as the exchange center for digital trade between China and ASEAN, thereby promoting the vigorous growth of digital trade.

4.4 Enhancing Risk Hedging and Resilience Building

Amid the current complex and volatile international environment, establishing a diversified supply chain backup system is urgently needed. Encouraging companies to distribute critical segments across multiple ASEAN countries can effectively prevent risks from a single country from impacting the entire industrial chain. For instance, dispersing operations such as raw material supply and production processing enhances the flexibility and stability of the supply chain. Promoting the expansion of China Export & Credit Insurance Corporation’s coverage in ASEAN will provide companies with more comprehensive risk protection. Supporting enterprises in using financial instruments like forward foreign exchange and futures to hedge against exchange rate and commodity price fluctuations will reduce losses caused by market uncertainties. Additionally, strengthening disaster emergency coordination with ASEAN and establishing early warning and rapid response mechanisms for cross-border supply chain disruptions will enhance the ability to respond to emergencies.

4.5 Promoting Mutual Recognition of Standards and Trade Facilitation

Disparate standards act as an invisible barrier, severely hindering deeper cooperation within the China-ASEAN region. It is crucial to leverage the ongoing negotiations for the China-ASEAN Free Trade Area 3.0 as a pivotal opportunity to actively promote mutual recognition of standards in key sectors such as electronics, electrical appliances, agricultural products, and pharmaceuticals. Harmonized standards can reduce additional costs incurred by enterprises due to regulatory differences and enhance product market compatibility. There should be a strong push for the mutual recognition of Authorized Economic Operator (AEO) programs to lower inspection rates, allowing compliant companies to benefit from more efficient customs clearance services. Exploring the implementation of "joint inspection at key ports" could break the constraints of traditional customs procedures, significantly shorten clearance times, improve trade efficiency, and foster greater liberalization and facilitation of regional trade, thereby elevating China-ASEAN economic cooperation

to new heights.

5. Typical Case Analysis

5.1 China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity

The project was launched in 2015 with the theme of "modern connectivity and a modern service economy," pioneering the "New International Land-Sea Trade Corridor." This corridor connects western China to ASEAN through Guangxi and Yunnan, with Singapore serving as a transit hub to global markets, reducing transit time by 15-20 days compared to the traditional Yangtze River route. It promotes cross-border financial innovation, enabling western Chinese companies to issue bonds and raise funds in Singapore. The project also establishes a China-Singapore data corridor and explores pilot offshore data centers. This model demonstrates that China-Singapore cooperation can serve as a leverage point to drive the integration and upgrading of the entire China-ASEAN industrial chain [5].

5.2 The Hub Role of Singapore's Port and Logistics Enterprises in ASEAN

Singapore Port is the world's largest transshipment hub, handling approximately 37 million TEUs annually, with about one-quarter of these related to China. Singaporean companies, represented by PSA International, invest in and operate multiple ports in countries such as Vietnam and Indonesia, exporting management expertise and digital systems. Firms like ST Telemedia and Keppel Logistics specialize in regional smart logistics solutions. Singapore's pivotal role makes it an indispensable "connector" in the industrial chain linkage between China and ASEAN.

5.3 ASEAN Expansion Models of Chinese New Energy Enterprises

Leading new energy companies such as CATL, BYD, and Trina Solar have established comprehensive "resource-manufacturing-market" supply chains in ASEAN. CATL invested $6 billion in Indonesia to build a power battery project, leveraging local nickel resources to supply products to Southeast Asia, Europe, and the United States. BYD established a factory in Thailand, focusing on the right-hand drive vehicle market to fill gaps in the local industrial chain. These projects typically adopt a "Chinese technology + local resources + Singapore headquarters + global market" model to achieve risk diversification and value enhancement.

Conclusion

China-ASEAN industrial chain cooperation stands at a crossroads of transformation and upgrading. While traditional processing trade models still dominate, they increasingly fail to meet the demands of global supply chain restructuring. Future collaboration should focus on building high-value-added regional value chains, using digitalization to overcome logistics bottlenecks, fully leveraging Singapore’s hub function, and establishing multi-dimensional risk hedging mechanisms. Successful cases like the China-Singapore Connectivity Initiative demonstrate that deepening institutional openness and mutual standards recognition are key to enhancing regional industrial chain resilience. Faced with a complex and volatile external environment, only by jointly promoting synergistic industrial chain upgrades can China and ASEAN collectively forge a new regional economic landscape characterized by stability, efficiency, and resilience.

References

[1] Qin Zhanghao. Impact of China-ASEAN Trade on China's Carbon Emissions: Based on LMDI Decomposition Method[J]. Science Technology and Industry, 2025,25(4):366-371.

[2] He Jianjun, Mao Wenli, Pan Hongyu. Financial Cooperation between China and ASEAN and Regional Innovation Development[J]. The Theory and Practice of Finance and Economics, 2022,43(2):17-23.

[3] Chen Xiulian, Hou Yuxin. Research on the Input and Output Servitization Level of China and ASEAN Manufacturing Industries Based on R&D Density under the Upgrade of China-ASEAN Free Trade Area (CAFTA)[J]. Science and Technology Management Research, 2024, 44(16): 23-35.

[4] Sun Haiyong. "The Situation, Challenges, and Expansion Paths of China-ASEAN Critical Mineral Cooperation." *Southeast Asian Affairs*, 2024(4):84-97.

[5] Liu Shuguang. The Construction of Regional Value Chains and the Deepening of China-ASEAN Economic and Trade Cooperation[J]. Asia-Pacific Economic Review, 2023(2): 45-53.