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Smart Trade Boosts the Circle: A Preliminary Exploration of the Construction of Regional Digital Platforms for International Trade

Yichun Li*

School of Economics, Peking University, Beijing, China

*chloelee98942@stu.pku.edu.cn

Abstract

Currently, the plan for building digital platforms for international trade has been implemented in Hubei Province, with Yichang taking the lead in constructing such a platform for the Yichang-Jingzhou-Jingmen metropolitan area. As one of the hub cities in central and western China, Yichang's initiative will provide new opportunities for transformation and upgrading in the future development of regional foreign trade and its own industrial growth. This paper attempts to explain the necessity, feasibility, and subsequent operational logic of building an international trade digital platform in Yichang by integrating relevant research on digital platform construction, corporate digital transformation, and the theoretical framework of economies of scale. It will focus on discussing the impact of such a platform on Yichang's representative industry-the phosphate mining industry.

Keywords

International Trade; Digital Platform; Economies of Scale; Network Effects; Global Value Chain; Phosphorus Chemical Industry.

1. Current Situation of Foreign Trade Development in Yichang

At the beginning of the 21st century, Hubei Province established the "One Main, Two Subsidiary" regional development strategic framework, and Yichang was clearly designated as a provincial sub-center city. In 2023, as one of the three key planned metropolitan areas in Hubei Province, the "Yichang-Jingzhou-Jingmen" metropolitan area plan was officially released; by the end of 2023, the total economic output of this metropolitan area had reached 1.1179 trillion yuan, showing a strong momentum of foreign trade growth. As the core city leading the construction of the international trade digital platform for the Yichang-Jingzhou-Jingmen metropolitan area, Yichang's development trend in the foreign trade sector in the post-pandemic era is of great research value.

In 2022, Yichang's total foreign trade import and export volume exceeded 40 billion yuan for the first time, reaching 41.47 billion yuan, a year-on-year increase of 22.6%, ranking among the top in Hubei Province. In 2023, Yichang's total foreign trade import and export value reached 44.57 billion yuan, an increase of 12.1% compared with 2022, hitting a historical peak. Among them, exports amounted to 38.07 billion yuan, a year-on-year increase of 9.1%; imports reached 6.5 billion yuan, a year-on-year increase of 33.8%. General trade dominated, with import and export value reaching 36.4 billion yuan, a year-on-year increase of 16.5%, accounting for 82.9% of the city's total import and export value. Private enterprises were particularly active, with import and export value reaching 33.19 billion yuan, a significant year-on-year increase of 33.3%, accounting for 74.5% of the total.

ASEAN, India, and the EU are Yichang's major trading partners. In 2023, the bilateral trade volumes were 8 billion yuan, 6.34 billion yuan, and 4.36 billion yuan respectively, with

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corresponding growth rates of 23.8%, 33.3%, and 4%. It is particularly noteworthy that Yichang's import and export value to countries along the "Belt and Road" reached 23.48 billion yuan, a year-on-year increase of 32.9%, showing a considerable growth rate and achieving good results in meeting the goal of market diversification.

In terms of export product structure, the export of mechanical and electrical products performed brilliantly, with a total value of 7.01 billion yuan, a year-on-year surge of 65.5%, accounting for 18.4% of the total export volume, an increase of 6.3 percentage points. Among them, exports of auto parts and ships increased particularly significantly, reaching 167.9% and 170.6% respectively. During the same period, exports of labor-intensive products and agricultural products, which reflect traditional comparative advantages, also maintained steady growth, with export volumes of 6.08 billion yuan and 3.24 billion yuan, increasing by 19% and 28% respectively.

The above data clearly reflect that Yichang's foreign trade is in a critical stage of structural optimization and industrial upgrading. Exports of mechanical and electrical products and high-tech products have grown rapidly, the overall added value of exports has increased, and the export structure is being optimized; trade volume with countries along the "Belt and Road" has grown at a relatively high rate, effectively expanding the breadth and depth of export destinations and deepening market diversification; private enterprises have become the core force driving foreign trade growth, showing strong vitality and resilience.

To sum up, the optimization and upgrading of export product structure, the development of emerging markets, and the increased activity of private enterprises constitute the main factors promoting Yichang's foreign trade growth. In this context, how to effectively respond to and lead the wave of international trade digitalization has become a new challenge for Yichang to promote the sustained and high-quality development of foreign trade.

2. Connotations of Trade Digitalization and Digital Platforms

What is international business and trade in the digital world?

The research group of the Development Research Center of the State Council pointed out in the research report Models and Paths for Digital Transformation of Traditional Industries that the essence of digital transformation is to reconstruct the ways, capabilities, and efficiency of collecting, transmitting, storing, processing, and feeding back data and information in economic activities, break down data barriers between different levels and industries, thereby reshaping the ways of trading and disseminating goods and knowledge, and giving birth to various new business formats and models[1]. Trade digitalization refers to the in-depth integration of new-generation digital technologies with traditional goods trade to realize the digital reconstruction of the entire trade process (including marketing, execution, services, etc.), so as to break through time and space constraints, reduce intermediate links, lower transaction costs, and ultimately improve trade facilitation and total factor productivity. Its essential characteristics are reflected in the "onlineization", "datafication", and "intelligentization" of trade processes, which drive the digital transformation of trade entities.

Deconstructing the links of trade digitalization includes digital trade marketing, which integrates online and offline display, negotiation, and matching mechanisms, and relies on foreign trade big data to achieve precise positioning and development of customers; digital trade execution, covering digital operation systems for domestic and cross-border logistics, warehouse management, and customs clearance processes; and digital trade services, which include digital support systems for market services, public services, port services, dispute resolution, after-sales services, and financial insurance.

Digital platforms are the core organizational form in today's digital economy era. Scholars such as Chen Jin and Liang Chen pointed out that digital platforms are important carriers of platform

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economy empowered by mobile Internet, big data, and cloud computing[3]. Scholars such as Ma Hongjia and Wang Chunlei analyzed that digital platforms help enterprises reduce costs and increase efficiency with modular architectures, and allow partners to connect with compatibility and scalability to achieve interconnection and sharing of information and data[7]; in the context of international trade, the technical foundation of digital platforms is further reflected in dedicated functions such as compliant cross-border data transmission, multi-currency intelligent settlement, and global logistics visualization.

Chen Jin, Liang Chen, and other scholars demonstrated that digital platforms are stages for network effects. Different market definitions correspond to different competitive strategies. In multi-sided markets, cross-side network effects are formed by aggregating multiple subjects such as suppliers, purchasers, logistics providers, and financial institutions. Ma Hongjia, Wang Chunlei, and other scholars pointed out that the core of digital platform capabilities is the ability to integrate and reconstruct internal and external resources, while the organizational characteristics of international trade digital platforms emphasize "borderlessness", that is, they can break geographical restrictions to connect global entities and reduce cross-border information asymmetry with intelligent matching algorithms, as proposed by scholars such as Zhao Huijuan and Chen Hongyang, who connect small and medium-sized manufacturing enterprises with overseas niche markets through user portraits and demand forecasting[5].

From the perspective of functional value, one of the major advantages of digital platforms is to promote value co-creation and optimal allocation of resources. Liu Yue proposed that platforms activate innovation vitality through internal enterprise entrepreneurship and value co-creation between users and suppliers[2]. In the context of international trade, value creation is more complex in the classification of business models summarized by scholars such as Ma Hongjia and Wang Chunlei: on the one hand, platforms can reduce cross-border transaction costs through efficiency-oriented business model innovation, such as simplifying customs declaration processes and integrating international logistics networks; on the other hand, they can explore incremental value through novel business model innovation, such as cross-border live-streaming e-commerce and digital supply chain finance.

It is worth noting that the connotation of international trade digital platforms also needs to include cross-border governance attributes. As scholars such as Chen Jin stated, compared with domestic platforms, they not only need to coordinate the interests of multiple subjects but also adapt to rules such as data sovereignty and tariff policies of different countries. Therefore, platform capabilities also include compliance risk control and rule adaptation capabilities. This governance attribute makes them go beyond the scope of simple technical tools and become "practitioners" and "shapers" of digital trade rules.

At the same time, it should be pointed out that this model may also trigger new monopoly risks, systemic risks, and issues such as the tilt of bargaining power towards buyers or platforms. However, Hubei's international trade digital platform has the characteristics of government-led governance. Led and supervised by the government and cooperating with big data centers, it may have a certain regulatory effect on resolving general platform governance issues[6].

Currently, the development of China's trade digitalization is still unbalanced and inadequate. Coastal areas such as Guangdong, Jiangsu, and Zhejiang have formed relatively mature platform operation systems relying on their first-mover advantages, while inland provinces are still in the initial stage of digitalization due to relatively backward infrastructure and industrial ecology.

Based on the above existing research, we can summarize the consensus reached by academic circles and policy research institutions: the core functions of digital platforms in the entire process of trade digitalization are focused on resource integration and channel intermediation. First, reducing intermediate transaction costs by integrating supply and demand resources to

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reduce intermediate friction; second, promoting knowledge diffusion, expanding the scope of knowledge circulation, and reducing its transfer costs; third, lowering market entry barriers, weakening the capital threshold required for traditional foreign investment and physical network setting; fourth, stimulating innovative efficiency competition among platform enterprises.[4] However, current research on foreign trade digital platforms mainly focuses on national platforms or relatively mature market-oriented platforms in coastal areas, leaving a gap in research on regional, government-led international trade digital platforms in inland areas; there are many studies exploring the optimization effect of platforms on trade processes from a macro perspective, but there is a lack of targeted analysis combining the specific characteristics of regional pillar industries, and the connection between platforms and the upgrading of resource-based industrial value chains needs to be explored.

Therefore, this paper takes the Yichang-Jingzhou-Jingmen metropolitan area international trade digital platform led by Yichang as a case to explore its operational logic and unique advantages, filling the gap in research on inland, government-led regional trade digital platforms; more specifically and in-depth exploring the mechanism by which platforms promote industrial upgrading through factors such as factor valuation; and innovatively deconstructing the digital platform effect in combination with the theory of economies of scale, filling the gap in the lack of a reference framework for trade digital transformation in central and western regions.

3. Necessity and Feasibility of Building a Digital Trade Platform in Yichang

3.1. Introduction to the International Trade Digital Platform of the Yichang-Jingzhou-Jingmen Metropolitan Area

The Yichang-Jingzhou-Jingmen international trade digital platform is a systematic integration of the established Hubei International Trade Single Window, Yichang Market Procurement Trade Platform, and Agricultural Product Export Tax Rebate Service Cloud Platform, with the embedding of the under-construction phosphorus chemical supply chain platform, forming a "1+2+3+N" collaborative structure. It includes one unified portal providing a global service entrance; two types of service channels, online and offline integrated service windows; three linking dimensions, leading industries (such as phosphorus chemical industry), open carriers (such as comprehensive bonded zones), and regional characteristic applications; and N functional modules integrating multiple online digital services such as customs clearance, taxation, and transactions.

Specifically, in terms of main service contents, the digital platform shares the public data base of the "Single Window" and provides one-stop services. Since the platform was launched in August 2024, it has registered more than 27,000 enterprises and processed over 270 million business transactions; new vertical applications such as phosphorus chemical import and export transactions have been established; and existing systems such as the agricultural product tax rebate cloud platform have been integrated. Currently, the platform has initially achieved large-scale enterprise entry and functional application.

3.2. Necessity and Feasibility of Building the Digital Trade Platform

The establishment of the international trade digital platform is driven by multiple pressures such as internal and external environmental factors, resource endowments, and changes in factor structures.

External environmental constraints: Since the post-pandemic era, domestic economic downward pressure has increased, domestic demand has weakened, and growth has slowed down; at the same time, domestic labor costs have risen rigidly, and problems such as "difficulty in recruiting workers and high labor costs" for foreign trade enterprises have become

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increasingly prominent. Costs such as raw materials, transportation, financing, and land have risen, increasing the upward economic pressure on foreign trade enterprises, weakening their product price advantages, and significantly compressing export profit margins, thus suppressing the competitive advantages of export products. In addition, fluctuations in the RMB exchange rate have increased the difficulty of enterprise exports. The RMB still faces appreciation pressure against the US dollar, and the operational risks of enterprise imports and exports continue to increase, suppressing enterprises' enthusiasm for undertaking long-term orders, and hindering their survival and development.

The macro political situation affects the development mechanism of the entire open economy, and thus affects the digital transformation, digital performance, and green innovation of enterprises. Internationally, trade protectionism continues, and new protection measures such as trade remedies and green trade barriers have emerged. China has become a "hardest-hit area" for trade frictions; moreover, due to rising labor prices in China and increasing pressure from resource and environmental constraints, low-end manufacturing sectors are accelerating their relocation to regions such as Vietnam, Laos, and Indonesia, while domestic upgrading to the high end of the value chain is also hindered and blocked. In this context, international trade competition pressure continues to increase, and the severity, complexity, and uncertainty of Yichang's foreign trade have significantly intensified.

Internal development bottlenecks: First, there is room for further optimization of Yichang's export commodity structure. Currently, Yichang's export commodities are still dominated by basic organic chemicals, agricultural products and food, pharmaceuticals, and steel. Exports of electronic and electrical products and mechanical equipment have grown to a certain extent, but their proportion is not very high. This indicates that Yichang's export enterprises still face problems of low added value of high-tech products and insufficient independent innovation capabilities, resulting in low technological content and added value of export products. Second, from the perspective of trade patterns, general trade still dominates, and the proportion of service trade is still low. Taking 2022 as an example, Yichang's imports and exports through general trade reached 33.42 billion yuan, an increase of 17.8%, accounting for 80.6% of the city's total import and export value in the same period; imports and exports through bonded logistics reached 3.01 billion yuan, an increase of 61.1%; imports and exports through processing trade reached 2.44 billion yuan. Third, although cross-border e-commerce in Yichang has taken shape, its regulatory system is far less mature than that in coastal areas.

There are both necessities and feasibilities for construction. Institutional foundations are gradually improving, with the number of national-level open ports, comprehensive bonded zones, cross-border e-commerce comprehensive pilot zones, and transformation and upgrading bases continuing to increase; the international trade "Single Window" is gradually improving, and cross-border logistics has achieved cost reduction and efficiency improvement; the total economic output of the metropolitan area exceeds one trillion yuan, providing room to absorb the potential scale benefits released by the platform's agglomeration effect; during the transformation window period, pillar industries such as phosphorus chemical industry urgently need to reconstruct the global supply chain through digitalization. Nevertheless, Yichang's cross-border e-commerce management service system is not perfect, and there is still a need to improve governance capabilities and means.

3.3. Analysis of Platform Utility Mechanism from the Perspective of Economies of Scale

3.3.1. Paths to Achieve Internal Economies of Scale

Regional international trade digital platforms empower enterprises to achieve internal economies of scale, essentially through integrating resources, optimizing processes, encouraging innovation, and other mechanisms to reduce enterprises' unit costs and improve

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production efficiency. The Yichang-Jingzhou-Jingmen metropolitan area international trade digital platform can empower enterprises to achieve internal economies of scale through three economic principles:

First, the sharing effect of fixed costs. Based on the Baumol-Panzar-Willig theory of cost subadditivity, economies of scale arise when the total cost of providing multiple services by a single platform is lower than the sum of the costs of providing them separately. The international trade digital platform integrates resources from Hubei's "Single Window" and builds a service system covering the entire trade chain. At the information level, the platform aggregates data such as global market dynamics, tariff policies, and exchange rate fluctuations, providing enterprises with free information query interfaces, avoiding repeated investments by enterprises in subscribing to commercial databases individually; at the service level, the platform embeds tools such as intelligent customs declaration, cross-border logistics price comparison, and foreign exchange settlement (for example, the "shared customs service market application" can automatically match the optimal customs broker, and "intelligent auxiliary declaration" reduces the declaration time from 8 hours to about 2 hours), eliminating the need for enterprises to build their own technical teams or connect with multiple service providers. This "one-stop" resource integration model allows fixed costs, including technology research and development and system maintenance, to be shared among 3,251 enterprises on the platform. Thus, many enterprises can centrally obtain these services on the platform, avoiding the high costs caused by searching for resources separately, and realizing the cost dilution effect brought by resource sharing.

Second, Pareto improvement of trade processes. Williamson pointed out in his transaction cost theory that more effective institutional arrangements can reduce information asymmetry and contract friction to lower transaction costs. The launch of the international trade digital platform can be regarded as an innovative institutional arrangement that optimizes redundant links in traditional trade processes and promotes Pareto improvement of trade processes. In the pre-transaction phase, the platform's "intelligent matching" function automatically pushes highly matched partners based on algorithmic analysis of buyers' and sellers' historical transactions, credit ratings, and demand characteristics, reducing enterprises' search costs; in the transaction phase, "blockchain certification" technology ensures the immutability of contracts and documents, and the "supply chain visualization" system tracks the location and status of goods in real time, reducing disputes and default risks caused by information opacity; in the post-transaction phase, the platform connects with tax and foreign exchange departments to realize online tax rebates and settlements, shortening the process cycle compared with traditional models. Improving operational efficiency and reducing unit operating costs to achieve cost reduction and efficiency improvement verifies the assertion that institutional innovation reduces friction costs.

Due to the existence of "path dependence", innovation itself is becoming increasingly large-scale. Path dependence theory points out that innovative activities have the characteristics of increasing returns to scale, and platforms provide a catalyst for this effect. International trade digital platforms can promote technological innovation of enterprises. On the one hand, platforms can provide enterprises with broader market information and communication opportunities. "Cloud exhibition applications" and "global trade information applications" enable enterprises to access international cutting-edge technologies and management experiences such as EU green packaging standards and Southeast Asian cross-border e-commerce marketing models at low cost, promoting technological innovation and improving production efficiency; on the other hand, the enterprise interaction community built by platforms can further promote innovation cooperation, enhance market competitiveness, expand production scale, and achieve economies of scale.

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Finally, we focus on the deepening of specialized division of labor. The expansion of trade scale on the platform promotes the refinement of certain enterprises' businesses. As Stigler's theory of industrial division of labor emphasizes, the expansion of market scale will lead to the deepening of division of labor, and platforms accelerate this process by expanding the trade radius. On the Yichang-Jingzhou-Jingmen metropolitan area international trade digital platform, with the growth of the number of enterprises and transaction scale, the refinement of division of labor presents two forms: first, "vertical division of labor". For example, phosphorus chemical enterprises outsource non-core links such as logistics and customs affairs to more professional third-party service providers, realizing real-time price comparison and docking in the platform-integrated logistics and warehousing service market application, while focusing on the research and development of phosphorus product purification technology, thereby improving labor productivity in core links; second, "horizontal division of labor". Specialized trade enterprises focusing on specific markets such as Southeast Asian agricultural products and European auto parts have gradually emerged on the platform, focusing on niche areas, gradually accumulating customer resources and channel advantages, and achieving the internal economies of scale effect of reducing unit costs and improving labor proficiency and resource allocation efficiency.

3.3.2. Realization Mechanism of External Economies of Scale and Multi-Stakeholder Collaboration Framework

In the theory of external economies of scale, we can relate that the expansion of industry scale benefits individual enterprises; the cost of congestion; economic agglomeration caused by external economies of scale; industrial cluster collaboration, knowledge spillover, resource sharing, etc., which improve overall efficiency; and skills or knowledge in production derived from practical experience accumulation. The generation mechanism of external economies of scale benefits of international trade digital platforms can be analyzed from the individual roles and collaborative effects of four subjects: suppliers, peer platforms, users, and the government (as shown in Figure 1).

Suppliers: Economies of scale from the integration of industrial clusters and industrial chains

First, from the perspective of suppliers, the agglomeration of suppliers is the basic source of external economies of scale. In international trade digital platforms, suppliers are based on enterprises, generating economies of scale in the process of geographical concentration and industrial chain collaboration.

Synergistic effect of industrial clusters. Combined with the reality of international trade digital platforms, platforms break geographical restrictions through digital means and gather a large number of foreign trade enterprises: as of July 2024, the platform has gathered 3,251 enterprises, forming a regional foreign trade ecosystem. Based on Krugman's spatial agglomeration theory, enterprises share resources such as logistics infrastructure, customs clearance data, and overseas market information, generating synergistic effects, reducing the overall operating costs of the region, highlighting the positive externalities brought by geographical concentration, and improving the overall competitiveness of the industry.

Vertical integration of industrial chains. By linking carriers such as Yichang Comprehensive Bonded Zone Big Data Precision Investment Promotion Platform and Three Gorges Bonded Logistics Center (Type B) Information Platform, the platform promotes collaborative development among different industrial parks, production enterprises, and service institutions in the region, forming a more complete industrial chain from production, logistics, customs clearance to settlement. This not only streamlines cross-border transaction processes but also facilitates data sharing to achieve precise docking between upstream and downstream enterprises. Upstream suppliers can obtain real-time order demand from downstream export

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enterprises through the platform, dynamically adjust production plans, improve the overall efficiency of the industrial chain, and enhance the overall competitiveness of regional industries.

Peer digital platforms: Diffusion of cross-platform learning effects

Second, from the perspective of peer digital platforms, interaction and learning between peers are important supplements to external economies of scale. Innovative practices of a single platform can achieve knowledge spillover to other platforms through industry exchanges, model imitation, etc., leading to efficiency improvement across the industry. Different trade digital platforms have room for mutual learning in technical applications such as matching algorithms and payment systems, as well as innovative service models such as the integration of e-commerce and live streaming. Taking Haofang's WMS intelligent overseas warehouse system as an example, after being learned by other platforms, it has been tested by the industry, reducing order processing time by about 50% and operating costs by 30%. Marshall's externality theory has pointed out that such knowledge spillover effects can continue to spread through the interaction of peer platforms, promoting technological upgrading and model innovation across the industry.

There is also a learning effect among enterprises on the same platform. The enterprise interaction network built by the platform increases the frequency of exchanges and interactions between enterprises, accelerates the spread and diffusion of technologies, management experiences, and models of successful enterprises in the region, and improves regional innovation capabilities; enterprises can learn from them, improve their own businesses, enhance the technical level and innovation capabilities of the regional industry as a whole, and "learning by doing" promotes industrial upgrading. Moreover, with the development of the platform, it is expected to attract more professional service institutions such as financial institutions and customs brokers, as well as talents, thereby bringing professional knowledge and skills, and improving the overall industrial quality of the region in the process of interacting with enterprises.

Users: Cross-network effects from users on both sides of the platform

Third, from the perspective of platforms and users, the users on both sides of the platform, namely merchants and consumers, their scale promotes each other proportionally, and the expansion of user scale is one of the important driving forces for promoting external economies of scale. One side of the international trade digital platform accesses supplier enterprises, and the other side accesses overseas purchasers and end consumers, thus forming significant network effects in the growth of their numbers and the increase in interaction frequency: first, the more overseas purchasers the platform attracts, the stronger its attractiveness to supplier enterprises; the increase in the number of supplier enterprises will further enrich the platform's product categories and service capabilities, forming a positive circular feedback. Second, end consumers participate in interactions through platform reviews, demand feedback, and other functions, and their data is integrated to feed back into suppliers' production decisions. This closed loop of user participation, data feedback to production optimization, can further amplify the platform's scale effect.

Government external support: Guarantee role of policies and systems

External support from the government provides an institutional guarantee for promoting external economies of scale. The government's policy support, rule-making, and infrastructure investment are conducive to creating a good environment for the interaction between platforms and enterprises.

The governments of Hubei Province and Yichang City have implemented policies such as tax reductions and exemptions and customs clearance facilitation to reduce platform operating costs, and provided preferential treatments such as expedited processing of export tax rebates for small and medium-sized foreign trade enterprises entering the platform; at the same time,

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government-led carriers such as cross-border e-commerce comprehensive pilot zones and bonded logistics centers are connected with the platform, providing enterprises with low-cost warehousing and customs clearance resources. In addition, the government has promoted the platform to connect with the international trade "Single Window" and participate in cross-border data compliance pilots, which has played a certain role in helping the platform break through international rule barriers. For example, linking the platform to the RCEP regional rules of origin database has significantly improved the efficiency of enterprises' tariff reduction declarations, achieving the effect of reducing institutional transaction costs of cross-border transactions through institutional coordination.

Multi-stakeholder collaboration effects

In the operation of international trade digital platforms, the multi-stakeholder collaboration of the above-mentioned subjects has made outstanding contributions to maximizing the effect of external economies of scale.

Two-party collaboration between suppliers and the government. The governments of Hubei Province and Yichang City have implemented the "Western Land-Sea New Corridor" strategy, forming policy cooperation with the launch of the international trade digital platform, enabling enterprises to connect with the logistics information of the Western Land-Sea New Corridor through the platform, take the "express train" of logistics developed by the Land-Sea New Corridor, which is conducive to improving logistics efficiency and reducing customs clearance costs; the Western Land-Sea New Corridor provides suppliers with more trade opportunities and market channels, helping them expand trade with ASEAN countries and regions along the route, and further integrate into the construction of the "Belt and Road" strategy. In addition, the Yichang-Jingzhou-Jingmen metropolitan area international trade digital platform, with the cooperation framework of the New Corridor policy, exchanges regulatory data with customs and tax departments along the corridor such as Chongqing Customs and Nanning Customs, which can shorten the review time of regulatory authorities for market entities declaring new corridor train goods through the platform and reduce enterprise compliance costs.

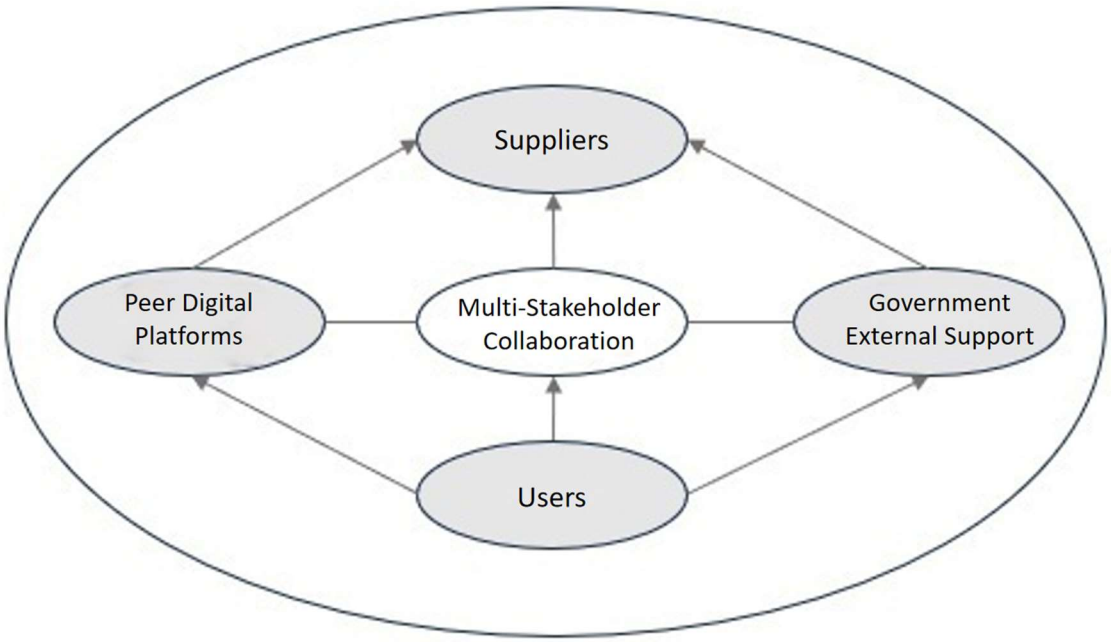

Figure 1. Realization Mechanism of External Economies of Scale and Multi-Stakeholder Collaboration Framework

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Suppliers, platforms, and users form a three-party collaborative relationship. User needs are integrated on the platform and transmitted to suppliers, and suppliers' product innovations are fed back to users through the platform, forming a virtuous cycle to promote industrial optimization and upgrading. Finally, the four-party collaboration of suppliers, peer platforms, users, and the government constitutes a complete digital and intelligent trade ecosystem; when the government introduces new regulations on cross-border data circulation, peer platforms can share compliance experience, which is transmitted to suppliers to optimize data management according to policies, and consumers obtain safer cross-border services. The integration of systems and innovations and the optimized docking of supply and demand under four-party collaboration make the theoretical logic of economic principles including economies of scale effects the "invisible hand" behind the economic practice of the platform.

4. Enabling Mechanisms and Constraints of International Trade Digital Platform Construction on Yichang's Phosphate Mining Industry

Yichang's development of foreign trade and active promotion of the construction of the Yichang-Jingzhou-Jingmen metropolitan area international trade digital platform are of great significance for promoting the development of the phosphorus chemical industry.

Yichang's phosphate ore reserves account for about 15% of the country's total, making it one of the important phosphorus chemical production bases in China and even the world. Therefore, by expanding foreign trade, this resource advantage can be further converted into economic advantages, realizing local mineral resources through exporting phosphorus chemical products, increasing foreign exchange income, and promoting local economic development.

This resource competitive advantage can be realized through two transformation channels constructed by the trade digital platform: factor valuation and technological renewal. First, the factor valuation channel. The expansion of the international market driven by the construction of the international trade digital platform can further amplify the export premium of phosphorus chemical products by about 23.6%, improving the efficiency of local resource capitalization. The technological renewal channel is based on the platform's connection to the global innovation network. A typical case is Yihua Group's introduction of Dutch wet-process phosphoric acid technology, which reduces unit energy consumption.

Combined with the aforementioned discussion, foreign trade of phosphate mining industry products promoted by the construction of digital platforms can promote the introduction and exchange of related industrial technologies in Yichang. Yichang's phosphorus chemical enterprises can take advantage of the platform to introduce advanced phosphorus chemical production technologies and management experiences through cooperation with the international market, enhance their own R&D capabilities and production efficiency, and promote industrial upgrading.

The platform helps shape and optimize the value chain of the phosphorus chemical industry. Yichang's phosphorus chemical products can open up channels in emerging markets such as ASEAN and India through the platform, increase sales channels, improve market share, which is conducive to reducing dependence on a single market and significantly enhancing risk resistance; at the same time, the expansion of foreign trade scale helps attract upstream and downstream enterprises in the related industrial chain to gather, promote the improvement of local industrial supporting rates, and form a relatively complete integrated industrial chain from mining-deep processing-cross-border trade. Thus, it can not only enhance the overall competitiveness of the industry but also drive the development of related supporting industries, forming an industrial cluster effect; at the same time, it can more conveniently establish cooperative relations with phosphorus chemical enterprises around the world with reduced intermediate transaction and coordination costs, realizing resource sharing and mutual benefit.

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The platform's intelligent matching function also reduces intermediate contract performance costs and cuts institutional transaction costs, echoing North's new institutional economics core proposition that "efficient institutions reduce transaction costs".

In general, through foreign trade based on digital platforms, enterprises in the phosphate mining industry can understand the latest trends and demands in the international market, adjust product structures, and improve product quality. Yichang can not only convert resource advantages into economic benefits but also promote technological progress, market expansion, and industrial chain improvement, thereby enhancing the international competitiveness of the entire phosphorus chemical industry.

However, Yichang has few competitive trade market entities, with problems such as few leading enterprises, scarcity of high-quality internet industries, difficulty in releasing brand effects, and weak industry discourse power. These problems need to be solved by further optimizing the industrial structure, cultivating leading enterprises, and strengthening brand building to enhance the overall competitiveness of Yichang's foreign trade. Therefore, we return to the initial issue of necessity: for Yichang to achieve leapfrog development in foreign trade, narrow the gap with developed coastal areas, build a new highland of inland opening-up, and break through the "geographical disadvantage trap" of inland areas, it must seek innovation on the basis of traditional trade models. If a regional international trade digital platform is built, and digital infrastructure is used to surpass traditional location constraints, Yichang is more likely to connect its phosphate resources directly to the international market through the platform, realizing a paradigm shift from static comparative advantage to dynamic connection advantage under the new situation of international competition and cooperation.

5. Conclusion

Based on the background of both opportunities and challenges in Yichang's foreign trade development, combined with theories such as economies of scale and transaction costs, this paper discusses the necessity, feasibility, and economic effects of building a regional international trade digital platform, and analyzes the mechanism of the platform's role in Yichang's phosphate mining industry with examples, drawing the following research conclusions:

First, Yichang City, Hubei Province, is in a critical period of structural transformation and upgrading of foreign trade, and building an international trade digital platform is a feasible and inevitable choice to cope with internal and external challenges. Yichang's foreign trade shows a trend of continuous growth in scale, increasing proportion of high value-added product exports, market diversification, and private enterprises leading growth. However, it still faces development bottlenecks such as the need to optimize the export structure, relatively traditional trade models, and lagging development of cross-border e-commerce. With the increase of external pressures such as rising costs in the post-pandemic era and the rise of trade protectionism, the demand for traditional trade models has changed. Carrying out digital transformation of trade by relying on digital platforms to integrate resources, optimize processes, and reduce costs will become the only way to solve difficulties and promote high-quality development of foreign trade.

Second, the efficiency improvement and cost optimization of the entire trade chain by international trade digital platforms can be interpreted with the theoretical mechanisms of internal and external economies of scale. From the perspective of internal economies of scale, the platform integrates resources from Hubei's "Single Window", realizes the sharing of fixed costs, and functions such as intelligent customs declaration and supply chain visualization optimize trade processes, reducing enterprises' unit transaction costs; at the same time, it promotes the deepening of specialized division of labor, encouraging enterprises to focus on

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improving production efficiency in core links. From the perspective of external economies of scale, the platform, through the agglomeration of suppliers to form industrial cluster collaboration, knowledge spillover from peer platforms, cross-network effects from users, and policy guarantees from the government, especially in cooperation with the "Western Land-Sea New Corridor" strategy to achieve cross-regional regulatory collaboration and logistics resource integration, amplifies scale effects through multi-stakeholder collaboration, reducing the overall operating costs and institutional transaction costs of the region.

Third, the international trade digital platform injects upgrading momentum into Yichang's phosphate mining industry. The platform integrates the factor valuation channel to amplify the export premium of phosphorus chemical products and improve the efficiency of resource capitalization; the technological renewal channel connects to the global innovation network to promote industrial technological upgrading; optimizes the value chain, helps phosphorus chemical products expand into emerging markets such as ASEAN, forms an integrated industrial chain from mining to deep processing to cross-border trade, and enhances risk resistance. However, the phosphate mining industry still faces constraints such as a lack of leading enterprises and weak brand effects, and needs to further cultivate core competitiveness with the help of the platform ecosystem.

In conclusion, taking advantage of the platform construction that effectively enhances opening-up functions, port functions, and trade functions, creating a market-oriented, law-based, and international business environment, and making good use of the Yichang-Jingzhou-Jingmen international trade digital platform will help Yichang form competitive advantages in foreign trade on a new track. Through these measures, Yichang can not only enhance its international trade status but also provide a strong model for the development of an open economy in Hubei Province and even central and western China.

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