

Construction of an Open Industrial System in Gansu Province under the Belt and Road Initiative: From Corridor Economy to Hub Economy

Qing Wang, Mingle Gao

Lanzhou University of Finance and Economics, School of Marxism, Lanzhou, Gansu, 730020, China

ABSTRACT

Against the backdrop of global industrial chain restructuring and the advancement of the "Belt and Road" Initiative, exploring Gansu's transformation from a corridor economy to a hub economy and the construction of an open industrial system holds significant importance for the western inland region to break through geographical constraints and achieve high-quality development of an open economy. This paper takes Gansu's open industrial system as the research object, elaborates on the research background and theoretical and practical foundations, analyzes the coupling logic of corridor economy, hub economy, and open industries within the open industrial system, reviews the current development status of Gansu's corridor economy and the foundation for hub economy transformation, and proposes a construction path following the logic of "hub foundation building - industrial upgrading - factor guarantee - collaborative linkage". The construction of Gansu's open industrial system is essentially a dynamic process of deep coupling among "corridor economy - hub economy - open industries". By strengthening the "hard connectivity" and "soft connectivity" of hubs, promoting the transformation of industries towards the high-end of the value chain, optimizing factor allocation, and deepening collaborative linkage, this path addresses the dilemmas of "open limitations, weak industries, and factor shortages". This path is suitable for Gansu's resource endowments and development stage, and can provide reference for the open development of underdeveloped regions in the western part of China.

KEYWORDS

The belt and road; Open industrial system; Corridor economy; Hub economy; Gansu province

1 Introduction

Currently, the restructuring of the global industrial chain is intertwined with regional economic integration, and the Belt and Road Initiative provides new opportunities for inland areas to break through geographical constraints and participate in international division of labor. As a key node in the golden section of the Silk Road Economic Belt, Gansu relies on the China-Europe Railway Express, Zhongchuan International Airport to form a cross-border corridor network featuring "land-air linkage." The "flow advantage" of the corridor economy is evident, but it also faces the contradiction of "difficulty in transforming corridor dividends into industrial dividends" - a high proportion of resource-based industries, lagging export-oriented high value-added industries, imbalanced trade structure, and prominent dilemmas of "more transit, less transformation" and "large flow, low value." The deepening of the New International Land-Sea Trade Corridor strategy in the west and the construction of the Lanzhou-Baiyin National Independent Innovation Demonstration Zone, among other policy dividends, provide windows for Gansu's transformation. How to promote the transformation of the industrial system towards a hub economy and build an open industrial system has become a key proposition for its integration into the "dual circulation" strategy.

To address this proposition, we can rely on existing academic research and theoretical logic. Scholars such as Zhao Guanghui (2019) have pointed out that although the corridor economy can leverage transportation to form a "flow advantage", purely transit transportation is difficult to transform the corridor dividend into an industrial dividend. It requires a transformation towards a higher level of economic form, which is in line with Gansu's predicament and highlights the necessity for it to leapfrog towards a hub economy. Xu Luyuan and Zou Zhongquan (2018), based on the case of equipment manufacturing industry clusters in Guangxi and Vietnam. It is concluded that "cluster development + cross-border linkage" can achieve an upgrade from "good transit" to "industrial chain synergy", providing a path for Gansu to cultivate export-oriented new material clusters based on its resources and build a cross-border agricultural industrial chain. Scholars such as Chen Wanling (2024) have proposed that less developed regions participating in the corridor economy need to optimize factor allocation and strengthen the synergy between industries and corridors in order to break through the dilemma of "limited openness, weak industries, and shortage of factors" providing direction for Gansu to transform policy dividends. Scholars such as Gu Chunguang (2018) have proposed an upgraded approach to the "Belt and Road" model based on the example of Southeast Asian cooperation, which also inspires Gansu to leverage its locational advantages, deepen cooperation with the eastern region internally, undertake industrial transfer, and promote equipment exports and technology output externally to meet the needs of Central Asia and South Asia, forming a "two-way opening" pattern.

In summary, the essence of constructing an open industrial system in Gansu Province lies in the process of transitioning from a corridor economy to a hub economy within the framework of the Belt and Road Initiative and the New International Land-Sea Trade Corridor. This paper combines the theory of coordinated regional economic development to

examine the current status of Gansu's corridor economy, analyze bottlenecks, and explore the coupling logic and construction path of an open industrial system, providing a reference for high-quality open development in the western inland regions.

2 The Coupling Logic of an Open Industrial System

The construction of an open industrial system in Gansu Province is a dynamic evolutionary process that implements the important directive spirit of "deeply integrating into the high-quality joint construction of the Belt and Road Initiative and the construction of the new land-sea corridor in the west", closely aligns with the strategic deployment of the provincial Party committee and government's "seven regions, one screen, and one corridor", and utilizes the node advantage of the Belt and Road Initiative as a link to achieve deep coupling of "corridor economy-hub economy-open industry". Its core is to break through the geographical constraints of the inland, transform "corridor flow" into "industrial value" through hierarchical leapfrogging and factor linkage, and form a linkage ecosystem of "corridor-industry-market".

The corridor economy serves as the starting point for an open industrial system. Relying on the China-Europe Railway Express, Zhongchuan International Airport, and other platforms, Gansu Province has established a "land-air linkage" corridor network, providing a fundamental carrier for factor mobility and industrial alignment. However, traditional corridor economies possess inherent limitations. They are highly dependent on transit transportation, with industrial activities concentrated in low value-added segments such as "loading and unloading, repacking, and basic warehousing," lacking core technology and brand support. The industrial chain is "dominated by resource export and lacks high-end manufacturing," with its radiation scope limited to the areas along the corridor, making it difficult to achieve comprehensive industrial linkage across the entire region. The contradiction of "easy access to traffic flow and difficulty in retaining value" determines that Gansu needs to be based on the channel economy, while breaking through path dependence and transitioning to a hub economy.

Hub economy serves as a crucial link connecting corridor economy and open industries. With the core logic of "factor agglomeration - industrial coupling - functional radiation", it upgrades the "transit corridor" to a "factor agglomeration hub" by integrating capital, technology, talent, data, and other factors, thus addressing the shortcomings of corridor economy. For Gansu Province, this coupling manifests in three transitions: at the factor level, it shifts from "passive dependence on external factor input" to "active agglomeration of local and external factors", attracting industries such as new energy equipment manufacturing and cross-border e-commerce to settle; at the industrial level, it transitions from "simple processing and basic logistics" to a composite system of "high-end manufacturing, modern services, and cross-border commerce and trade", relying on nodes such as Lanzhou to form an integrated function of "logistics distribution + industrial manufacturing + commerce and trade services"; at the radiation level, it shifts from "linear along-the-line radiation" to "network-wide global radiation", driving internal coordination across the province and connecting external markets in Central Asia and South Asia, achieving the transformation from a "transit node" to a "regional industrial center".

An open industrial system provides direction for the transformation of hub economy, while hub economy lays the foundation for open industries, forming a bidirectional coupling of "objective-support". Taking the node advantages of the Belt and Road as a link, resources such as new energy, non-ferrous metals, and specialty agricultural products are transformed into competitive export-oriented industries, undertaking industrial transfers from the east and connecting with international markets, forming an "inland node-type" open ecosystem. This objective relies on the three major characteristics of hub economy: factor mobility, breaking regional and national boundaries to achieve cross-domain allocation of factors; industrial chain synergy, promoting the formation of advantages in the industrial chain based on local endowments and embedding it into the global value chain; functional extroversion, possessing bidirectional capabilities of "bringing in" and "going out". Ultimately, through the path of "channel economy providing flow - hub economy achieving upgrading - open industries embedding into the value chain", a qualitative change from "channel transit" to "industrial opening" is realized.

3 Current Development Status of Gansu Corridor Economy and Foundations for Hub Economic Transformation under the Belt and Road Initiative

3.1 Current Development Status of Gansu Corridor Economy

The Gansu corridor economy, relying on the gradually taking shape of a "land-air linkage, multimodal transport" transportation network, has a solid traffic foundation, but it still retains the characteristics of being primarily transit-oriented with weak local transformation.

In terms of transportation corridor construction, a cross-border corridor system has been established, with Lanzhou as the core, and the China-Europe Railway Express (Lanzhou Line), Lianhuo Expressway serving as the land route backbone, and Zhongchuan International Airport as the aviation hub. In 2024, the international railway express shipment volume exceeded 800 trains, air cargo volume increased by 18.7% year-on-year, and railway and highway freight transport steadily improved. The digitization of infrastructure accelerated, with 42,000 5G base stations across the province, the number of industrial internet platforms increased to 40, the proportion of new energy power transmission increased to

50%, and the logistics cost as a percentage of GDP decreased to 14.3%, providing hardware support for the efficient operation of the corridor. In terms of the layout of open platforms, national-level functional zones such as Lanzhou New Area and Lanzhou High-Tech Industrial Development Zone have been formed. The open carrier matrix linked with the Tianshui and Lanzhou cross-border e-commerce comprehensive pilot zones has enhanced the level of customs clearance facilitation through platforms such as the comprehensive bonded zone, airports, and the Lanzhou-Qinghai Investment and Trade Fair. In the first three quarters of 2024, the operating income of the "three new economies" reached 64.289 billion yuan, a year-on-year increase of 23.85%. The scale of cross-border trade in new energy and specialty agricultural products has expanded, but the trade structure is extensive, with primary product exports accounting for over 50% and insufficient exports of high value-added industrial manufactured goods, resulting in low efficiency in converting traffic into value. In terms of industrial undertaking and linkage, some labor-intensive and resource processing industries have been undertaken through the corridor. Enterprises such as Jiuguan Iron and Steel and Jinchuan have realized the import of raw materials and the export of products through the corridor. The Jiuguan Wind Power Base and the Jinchuan New Energy Battery Materials Cluster have formed a certain agglomeration effect. However, industrial activities are concentrated in low value-added links, the supporting infrastructure of the industrial chain is imperfect, the new energy industry focuses on power generation, and downstream equipment manufacturing is weak. Traditional resource-based industries lack deep processing, and the proportion of locally produced and processed goods transported through the corridor is low, with most traffic merely "transiting and circulating", moreover, there is a lack of overall planning between the corridor and platforms, and the "corridor-port linkage" between Lanzhou's land and air ports and the comprehensive bonded zone has not been implemented. The resources of Tianshui and Lanzhou's cross-border e-commerce have not been integrated, and the resources are scattered, making it difficult to achieve scale effects.

3.2 Basic Conditions for the Economic Transformation of Gansu Hub

Gansu Province possesses multiple foundations for its transformation towards a hub economy, stemming from the combination of local resource endowments, industrial accumulation and policies, as well as regional collaborative opportunities.

In terms of resource endowments, Gansu, as a key new energy base in China, is abundant in wind and solar energy. The Jiuguan Wind Power Base and photovoltaic bases such as Zhangye have taken shape. Jinchuan has established a new energy power generation and battery cluster worth hundreds of billions. With a new energy power transmission ratio of 50%, supporting new energy equipment manufacturing and cross-border power trade. Gansu ranks among the top in China in terms of reserves of non-ferrous metals such as nickel and copper. Jinchuan Group has research and development advantages in nickel, cobalt new materials and high-end metal powder fields, which can form an export-oriented new material cluster. Modern cold and arid agriculture is solid, with Zhangye's corn seed production accounting for half of the domestic market. Dingxi's potatoes and Longnan's specialty agricultural products have formed a complete industrial chain. The "Ganwei" brand has the potential to connect with the international market, providing high-quality supply for deep processing of agricultural products and cross-border e-commerce. In terms of policy and platform support, the "Belt and Road", the New International Land-Sea Trade Corridor, and the Lanzhou-Baiyin National Independent Innovation Demonstration Zone converge. Gansu has issued policies such as the "Action Plan for Building a Key New Energy and New Energy Equipment Manufacturing Base in China" and the "Three-Year Action Plan for Accelerating the 'Intelligent Transformation, Digital Upgrade, Network Interconnection' in the Industrial Sector". The Lanzhou and Tianshui cross-border e-commerce comprehensive pilot zones are operational, and the Lanzhou New Area, comprehensive bonded zones, and airports are working together to ensure the normalized two-way operation of international trains. By 2024, the province will have 1,000 investment attraction projects, with the online government service handling rate increasing to 95%. The market-oriented, law-based, and international business environment continues to be optimized, facilitating factor agglomeration and industrial landing. In terms of industry and transportation infrastructure, as an old industrial base, Gansu has a solid foundation in non-ferrous metallurgy and petrochemical industries. Leading enterprises such as Jiuguan Iron and Steel and Jinchuan have transformed through "three modernizations" (i.e., mechanization, informatization, and greenization) to become high-end and intelligent. In the first three quarters of 2024, the total industrial output value of provincial enterprises increased by 18.48% year-on-year; new energy equipment Emerging industries such as equipment manufacturing, biomedicine, and the digital economy have seen rapid growth, with the operating revenue of the "Three New Economies" increasing by 23.85% year-on-year. The transportation system has formed a pattern of "land-air linkage", with the China-Europe Railway Express (Lanzhou line) radiating to Central Asia and Europe, the third phase of Zhongchuan International Airport commencing operations, and the logistics corridor in northern Lanzhou being expedited. 5G base stations and industrial internet platforms have been improved, with the 5G penetration rate among large industrial enterprises reaching 40.38% in 2024, supporting the circulation of essential factors and the digital transformation of industries. In terms of regional synergy potential, the location advantage is prominent. Located at the junction of the east and the west, and connecting the south and the north, it can deepen cooperation with eastern coastal provinces internally, undertake the transfer of export-oriented industries from the Yangtze River Delta and the Pearl River Delta, and open up a sea-rail intermodal transportation corridor of "inland - port -

international market" through eastern ports. Externally, relying on the Belt and Road Initiative, it can carry out production capacity cooperation with Central Asia and South Asia, promote the export of new energy equipment and agricultural technology, and import mineral resources and specialty agricultural products. Cooperation with the Lanzhou urban agglomeration and the Guanzhong Plain urban agglomeration in the new energy industry belt and cross-border logistics network is expected to form a "western inland hub cluster", amplifying the radiation effect.

4 The Path for Constructing an open Industrial System in Gansu Province under the Belt and Road Initiative

The construction of an open industrial system in Gansu Province should leverage the development of the New International Land-Sea Trade Corridor in the western region as a key lever. It should closely align with the logic of transitioning from a corridor economy to a hub economy, and follow a progressive approach centered around "hub foundation building - industrial upgrading - factor resource guarantee - collaborative linkage". This approach aims to address the shortcomings of inland openness and establish an open path tailored to the underdeveloped regions of the western part of China.

Based on the construction of hub carriers, strengthen the synergy between "hard connectivity" and "soft connectivity". Focus on key nodes such as Lanzhou and Tianshui, optimize the spatial layout of "land port + air port + comprehensive bonded zone", promote the "zone-port linkage" between Lanzhou land port and Zhongchuan International Airport, and achieve data interoperability between railway, aviation, and customs; refer to the experience of "smart ports", introduce intelligent sorting and blockchain traceability systems to enhance the efficiency of cargo distribution, accelerate the full coverage of 5G base stations and industrial internet platforms in industrial parks. Promote institutional openness, benchmark customs clearance facilitation standards, promote the cross-provincial "one-port pass" model to achieve direct release for exports and direct access for imports, establish a mutual recognition mechanism for technical standards and inspection and quarantine cooperation with Central Asian and South Asian countries, rely on the Lanzhou-Qinghai Economic and Cultural Cooperation Forum and the China-Europe Cultural Expo to upgrade international exchange functions and cultivate a climate of people-to-people connectivity. Strengthen cross-border platform support, promote the construction of Lanzhou New Area as the core area of the "Belt and Road" western opening hub, upgrade the Tianshui and Lanzhou comprehensive pilot zones for cross-border e-commerce, and build a "cross-border e-commerce + industrial cluster" docking platform; learn from China-Singapore (Chongqing) Based on the experience of the interconnection demonstration project, a special zone for the transformation of scientific and technological achievements has been established in Lanzhou New Area, focusing on new energy and biomedicine to build a cross-border chain of "research and development - pilot testing - industrialization".

With industrial upgrading as the core, we should promote the transformation towards the mid-to-high end of the value chain. Based on resource endowments and channel market demands, in terms of traditional industries, we should rely on leading enterprises such as Jinchuan and Jiuquan Iron and Steel to extend the industrial chain, develop high-end new materials such as nickel-cobalt high-temperature alloys and power battery materials, meet the demand for new energy battery manufacturing in Central Asia, and enhance international competitiveness. In the new energy industry, relying on the Jiuquan Wind Power Base and Jinchang New Energy Battery Cluster, we should cultivate photovoltaic modules. The wind power equipment manufacturing industry belt has formed an integrated pattern of "production-assembly-export", utilizing the new land-sea corridor in the west to shorten the transportation cycle to ASEAN and South Asia. In terms of characteristic agriculture, standardized production and intensive processing are promoted around "sweet" products, referencing the "origin warehouse + cross-border e-commerce + cold chain logistics" model. Cross-border agricultural product bonded processing bases are arranged in Lanzhou and Tianshui, connecting directly to the high-end market of ASEAN through the Beibu Gulf Port. Hub-type service industries are cultivated, and the quality of the Lanzhou International Train Assembly Center is improved. Exploration is made on the "China-Europe Train + bulk commodity trading" and "China-Europe Train

The new business model of "bonded processing" promotes the development of modern service industries such as cross-border finance and digital trade, driving the digital transformation of traditional trade. Supported by elemental guarantees, optimize the efficiency of resource allocation. Addressing the shortcomings in talent, technology, and capital, we deepen the "Longyuan Talent" program in talent and technology, targeting the introduction of talents in short supply such as foreign trade operations and cross-border logistics, and providing housing subsidies and research funding support. We deepen the cooperation with Lanzhou University and the Lanzhou Branch of the Chinese Academy of Sciences in industry-university-research cooperation, jointly building an export-oriented industrial technology innovation center, tackling core technologies in new energy equipment and new materials, and improving the rate of achievement transformation. In terms of capital and policy, we establish a special fund for logistics development in the Gansu section of the New International Land-Sea Trade Corridor, providing subsidies for cross-border trains and cold chain logistics projects. We implement tax relief and land use guarantee policies, simplify the approval process for foreign-funded enterprises, and attract eastern capital to participate in industrial upgrading. In terms of elemental flow, relying on the "east data, west computing" project, we build a cross-border trade big data platform, integrating logistics, market,

and policy information, breaking down barriers to regional elemental flow, and promoting the free allocation of talent, technology, and data across regions and borders.

Expanding through collaborative linkage, we aim to build a new pattern of internal and external openness. We will deepen the bidirectional linkage between domestic and international levels. At the domestic level, we will strengthen industrial cooperation with eastern provinces such as Shandong and Zhejiang, and utilize Qingdao Port and Ningbo Port to open up sea-rail intermodal transport channels. We will promote cooperation with the Lanxi and Guanzhong Plain urban agglomerations to jointly build the new energy industrial belt and cross-border logistics network in the Hexi Corridor, achieving "shared channels and complementary industries." At the international level, focusing on the needs of Central Asia and South Asia for energy equipment shortages and agricultural technology deficiencies, we will promote the export of photovoltaic modules and wind turbine towers, and export cold and arid agricultural planting technologies. We will import nickel and copper resources from Central Asia, forming a "two-way trade + industrial cooperation" pattern, and jointly build overseas warehouses and industrial cooperation parks in countries along the route. At the inter-provincial collaboration level, we will participate in the "13+2" inter-provincial joint mechanism of the New International Land-Sea Trade Corridor, collaborate with Chongqing, Guangxi, and other provinces to integrate cargo sources and optimize transportation routes, increase the density of cross-border trains and the proportion of return cargo sources, and enhance the overall openness and competitiveness of the western inland region through "going global together."

5 Conclusion

The dual empowerment of the Belt and Road Initiative and the New International Land-Sea Trade Corridor strategy provides a historic opportunity for Gansu Province to break through geographical constraints and reconstruct its industrial structure. The essence of building an open industrial system in Gansu lies in achieving a transformation from a "flow-dependent" corridor economy to a "value-creating hub economy, addressing the limitations of openness, weak industries. The triple dilemma of "factor scarcity".

Research indicates that the construction of this system is a dynamic process of deep coupling among "corridor economy-hub economy-open industry", requiring a progressive logic of "hub foundation. industrial upgrading, factor guarantee, and collaborative linkage" to form an open ecosystem featuring internal and external linkage and comprehensive coordination. Among them, the "hard connectivity + soft connectivity" of the hub carrier serves as the foundation, industrial upgrading as the core, factor guarantee as the support, and collaborative linkage as the expansion. This path not only aligns with the theory of new and old growth drivers transformation and regional coordinated development, but also adapts to Gansu's resource endowment and development stage, providing a practical framework for building an open industrial system in the western inland regions. Gansu's transformation practice is a vivid embodiment of inland regions promoting high-quality development through high-level opening up. Its core logic lies in leveraging its own advantages, embedding itself into national strategies, and connecting internal and external markets. Through systematic transformation, it achieves a qualitative change from a "transit node" to a "regional industrial center", injecting momentum into its own high-quality economic development and providing useful reference for the western inland regions to deeply integrate into the "dual circulation" and jointly build the "Belt and Road".

About the Author

Qing Wang, male, Master's Degree, Research Direction: Study on the Sinicization of Marxism.

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