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Department of Sociology, Economic
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International Economics and Business

GRADUATION THESIS

on

Development of Enterprises in Countries of «One Belt One Road»

Master's degree student

signature, date

Xu Tingli

Academic adviser

signature, date

Skvortsova V. A.

Compliance supervisor

signature, date

Vlazneva S. A.

Reviewer

Associate Professor of the Department
of Finance and Business Informatization
of Federal State Budgetary Educational
Institution of Higher Education
Penza State Agricultural University

signature, date

Fudina E. V.

The thesis was approved for defence (record of the department meeting dated _____ no.____)

Head of the Department

signature, date

Rozhkova L.V.

The thesis was defended and marked _____ (record of the State Examination Board dated
_____ no.____)

Secretary of the SEB

signature, date

Rasskazova N. V.

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FSBEI HE Penza State University
Institute of Economics and Administration
Department of Sociology, Economic Theory and International Processes
Field of study 38.04.01 Economics,
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APPROVED BY:
Head of the Department
Doctor of Social Sciences,
Professor
Rozhkova L.V.

« _____ » _____ 20 ____

ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Xu Tingli, group 24ЭЭВам1, full-time mode of study

1 The topic of the graduation thesis: "Development of Enterprises in Countries of «One Belt One Road»"

was approved by the university order
dated « ____ » _____ 20 ____ no. _____

2 The deadline for the Master's degree student to complete the graduation thesis is 15.06.2026.

3 The input data for the graduation thesis is the regulatory and legal framework, scientific literature and reference books, and Internet data.

4 The list of issues to be studied includes overview of the «One Belt and One Road» initiative; current status of enterprise development in OBOR countries; challenges faced by enterprises and corresponding strategies.

5 The list of visuals contains tables and figures.

6 The date of setting the assignment is 8.10.2024.

Academic adviser _____ / Skvortsova V. A. /
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Xu Tingli /
(signature) (full name)

Schedule for completing the graduation thesis

№ п/п	Content of the thesis	Deadline for completion	Due date, signature of the academic adviser
First year of study			
1	Substantiating of the research topic and methodology, subject and object of research	1.09.2024 – 31.10.2024	
2	Framing the scientific concept of research	1.11.2024 – 18.12.2024	
3	Collection of scientific literature for the thesis	19.12.2024 – 15.01.2025	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2025 – 19.02.2025	
5	Framing of a detailed plan and layout of the research	20.02.2025 – 12.03.2025	
6	Studying new literature sources within the topic of the thesis	13.03.2025 – 26.03.2025	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2025 – 30.04.2025	
8	Preparing the first chapter of the thesis	1.05.2025 – 30.06.2025	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2025 – 22.10.2025	
10	Preparing the second chapter of the thesis	23.10.2025 – 24.12.2025	
11	Conducting analytical research within the third chapter of the thesis	25.12.2025 – 25.02.2026	
12	Preparing the third chapter of the thesis	26.02.2026 – 21.04.2026	
13	Preparing the introduction and conclusion	22.04.2026 – 12.05.2026	
14	Completing the graduation thesis	13.05.2026 – 27.05.2026	
15	Handing in the thesis for compliance control and antiplagiat	28.05.2026 – 11.06.2026	
16	Getting acquainted with the feedback and review	13.06.2026	
17	Presenting the written thesis	15.06.2026	

Academic adviser _____ / Skvortsova V. A. /
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Xu Tingli /
(signature) (full name)

Summary

The graduation thesis comprises 71 pages, 3 chapters, 8 figures, 10 tables, 68 sources.

KEY WORDS: BELT AND ROAD INITIATIVE, INDIGENOUS ENTERPRISES OF HOST COUNTRIES, INSTITUTIONAL DISTANCE, TRADE GRAVITY

The target of research is to investigate the development mechanisms, institutional constraints, and strategic responses of local enterprises in Belt and Road countries, and to provide empirical evidence for high-quality regional cooperation.

The goal of work is to study analyze the economic opportunities and institutional barriers facing enterprises along the Belt and Road, and to offer practical recommendations for infrastructure upgrading, regulatory harmonization, and trade facilitation through theoretical and empirical analysis.

The methodological framework of the paper is formed by the complex of theoretical and practical methods such as used are literature research, qualitative analysis, comparative analysis, quantitative analysis (gravity model), and case study analysis.

The results of research include: an analysis of opportunities, institutional barriers, and infrastructure challenges for BRI enterprises; empirical evidence that infrastructure quality and institutional distance significantly affect export upgrading; and practical strategies for sustainable development through infrastructure investment and regulatory coordination.

The recommendations on disseminating and applying the results are as follows: The results can serve as decision-making references for government agencies in designing infrastructure investment and regulatory coordination policies; for enterprises in assessing market entry risks and opportunities; and for researchers as a foundation for further empirical studies on BRI enterprise development.

The theoretical relevance of the thesis is established by its theoretical innovation in constructing an integrative analytical framework, and its contribution to enriching international trade and institutional economics theories with empirical evidence from the Belt and Road context.

The target of research can be further explored through field investigations and case analyses targeting typical enterprises and key economic corridors, in-depth micro-level case studies with long-term tracking of individual firms, and empirical research on emerging areas such as digital infrastructure and industry-education integration under the BRI framework.

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Introduction

Since the proposal of the Belt and Road Initiative (BRI) in 2013, the initiative has evolved from a conceptual vision into substantial international cooperation practice, acting as a core driving force for the reform of the global economic governance system and coordinated regional economic development. By early 2026, more than 150 countries and 30 international organizations worldwide have participated in BRI construction, with continuously expanded cooperation coverage and deepened cooperation levels. Official statistics indicate that BRI partner countries contribute over 60 % of China's foreign trade growth, accounting for more than half of China's total foreign trade volume. Meanwhile, China's outward direct investment (ODI) in BRI countries maintains an annual growth rate of over 20 %, occupying more than a quarter of China's total ODI stock. These macroeconomic data fully demonstrate that the BRI has profoundly reshaped the economic geography and international trade pattern of regions along the routes.

Nevertheless, it remains an unsolved core academic issue whether the continuous expansion of macro trade and investment scale can be effectively transformed into endogenous development momentum for local enterprises in host countries along the routes. It directly determines the micro implementation effect of the BRI and the high-quality development of the initiative whether local enterprises can achieve productivity improvement and market expansion through technology spillovers and trade facilitation dividends, or face competitive pressure and development constraints due to the influx of foreign capital and products. Existing studies mostly focus on macro aggregate effects, with insufficient discussion on the micro development response mechanism of enterprises and lack of systematic conclusions. Accordingly, this paper takes local enterprises in BRI countries as the core research subject to explore their development logic and mechanism under the BRI framework.

Extensive academic discussions have been conducted on the economic effects of the BRI, forming multi-layered research perspectives covering macro trade effects, cross-border investment mechanisms and micro enterprise performance. Previous scholarship generally focuses on the macroeconomic influence of the BRI, exploring how

the initiative reshapes trade costs, trade potential and global value chain positions of participating economies. Relevant findings confirm that infrastructure upgrading and trade facilitation reforms under the BRI significantly promote bilateral trade growth and regional economic integration, yet most macro-level analyses remain limited to aggregated economic outcomes and fail to explain the internal micro-level processes of industrial restructuring, efficiency improvement and technological upgrading of individual enterprises. Scholarship centering on China's cross-border investment activities under the BRI mainly examines how Chinese outward investment facilitates infrastructure construction, employment expansion and industrial optimization in host economies. Although such research explains the macroeconomic benefits of BRI cooperation from the investor country's perspective, it largely overlooks local enterprises' strategic responses, independent capacity accumulation and institutional frictions arising in cross-border cooperation contexts. With the gradual deepening of research perspectives, emerging studies have begun to focus on micro enterprise performance, utilizing enterprise survey data and financial statistics to analyze how BRI policies affect corporate total factor productivity, export efficiency and global value chain embedding. Existing evidence confirms that institutional docking, infrastructure connectivity and trade barrier reduction under the BRI effectively enhance the productivity and technological level of enterprises in participating countries, while China's bilateral trade activities further drive technological progress in local firms. Even so, micro-level research specifically targeting indigenous enterprises in BRI host countries remains insufficient. Current literature generally presents optimistic and linear conclusions regarding BRI economic benefits, while neglecting the structural coexistence of development opportunities and institutional constraints in the implementation of cross-border cooperation initiatives. A series of critical academic questions remain underexplored, including how institutional heterogeneity shapes local enterprises' market entry and technological upgrading decisions, how infrastructure connectivity translates into sustainable corporate productivity growth, and to what extent trade facilitation dividends benefit enterprises of different scales. Such research deficiencies constitute the core theoretical motivation and research gaps that the present study intends to address.

The goal of this study is aimed at systematical exploration the development logic, current situations, core dilemmas and optimization paths of indigenous enterprises in Belt and Road participating economies. It aims to clarify the internal transmission mechanism between BRI institutional arrangements, regional institutional environments and micro-level corporate behaviors, and further construct a systematic theoretical framework centered on the development of local enterprises along the routes. This research attempts to bridge the existing disconnection between macro policy effects and micro enterprise performance in previous literature, enrich the theoretical system of high-quality BRI cooperation from a microeconomic perspective, and provide solid empirical evidence and theoretical references for the upgrading of regional economic and trade cooperation.

The objectives of this study. This study clarifies the institutional framework and operational mechanisms of the Belt and Road Initiative, and further analyses the external conditions and developmental opportunities brought by macro cooperation arrangements to indigenous enterprises in participating regions. It further explores institutional heterogeneity across Belt and Road countries in terms of business environments, legal regulations and trade policies, and investigates how institutional differences impose structural constraints on corporate operational decisions and developmental performance. This research also identifies heterogeneous development characteristics among enterprises from diverse industries, scales and economic backgrounds, and explores adaptive strategies and competitive development paths for local enterprises under different institutional environments. Furthermore, based on panel data covering 60 Belt and Road economies from 2015 to 2024 and an extended trade gravity model, this study quantitatively examines the influence of infrastructure quality, institutional distance and cooperation intensity on corporate export technological upgrading, so as to provide robust empirical support for the proposed theoretical framework.

The subject of this study corresponds to the development mechanism of indigenous enterprises in Belt and Road participating countries. The research scope covers market entry conditions, technological upgrading paths and global value chain embedding characteristics of local enterprises driven by BRI cooperation, as well as institutional restrictions and infrastructure bottlenecks constraining corporate sustainable development.

The core research proposition of this paper lies in exploring how macro institutional arrangements of the BRI influence micro-level corporate operational behaviors, technological capabilities and comprehensive performance through the intermediary effect of regional business environments.

The research objects of this study are indigenous enterprises located in Belt and Road participating countries, with a particular focus on small and medium-sized enterprises and newly industrialized enterprises operating in manufacturing and tradable service industries. In accordance with the World Bank's economic classification criteria, the sample covers high-income economies, newly industrialized economies and low- and middle-income developing economies. Such sample coverage enables this study to comprehensively summarize behavioral characteristics and developmental differences of local enterprises under diverse economic conditions, thereby ensuring the comprehensiveness and universality of the research conclusions.

This study adopts a triangulation research framework integrating multiple complementary methodological approaches to guarantee research systemic nature, rigor and robustness.

The research conducts systematic literature sorting and theoretical induction, focusing on infrastructure connectivity, trade facilitation, institutional heterogeneity and corporate export upgrading. By summarizing mainstream theoretical viewpoints and empirical findings, this study identifies existing research deficiencies and establishes a solid theoretical foundation for framework construction.

Comparative institutional analysis is further applied to explore differences in business systems, legal norms and trade policies across Belt and Road regions. By constructing a multi-dimensional comparative framework, this study identifies key institutional and structural factors leading to developmental differentiation among local enterprises.

Moreover, quantitative econometric analysis is adopted based on balanced panel data of 60 Belt and Road economies from 2015 to 2024. With an extended gravity model, this study quantifies the influence direction, mechanism and intensity of infrastructure quality, institutional distance and BRI cooperation intensity on corporate export

technological sophistication, so as to verify theoretical hypotheses and form reliable quantitative conclusions. The above methods progress hierarchically and complement one another, effectively remedying the separation between macro analysis and micro evidence, as well as the disconnection between theoretical deduction and empirical verification in existing studies.

This study presents significant novelty and innovations in research perspective, theoretical framework and empirical findings.

In terms of research perspective, most existing BRI-related studies adopt the investor-country perspective and focus on China's outward investment location choices and macroeconomic effects. This study shifts the analytical perspective toward indigenous enterprises in host countries, treating local firms as active adaptive participants rather than passive beneficiaries of policy dividends. This innovative perspective fills the existing research gap regarding micro-level behavioral subjects in BRI participating economies.

In terms of theoretical framework, this study establishes an original three-dimensional «Initiative-Institution-Enterprise» analytical system, integrating macro institutional arrangements, meso-level regional institutional environments and micro corporate export performance within a unified logical framework. It clearly defines the complete transmission path from macro institutional signals and meso institutional adaptation to micro corporate upgrading. Meanwhile, the introduction of the Kogut-Singh institutional distance index into export upgrading empirical models realizes effective integration of institutional theory and econometric analysis [28, p. 142].

In terms of empirical findings, this study draws innovative conclusions based on ten-year manually sorted cross-border panel data. Different from traditional assumptions that institutional distance hinders cross-border corporate cooperation, empirical results reveal a significantly positive correlation between institutional distance and local enterprises' export technological sophistication after controlling economic development level, infrastructure conditions and trade openness. The findings challenge the conventional prerequisite of institutional homogeneity for international trade cooperation, and verify a new micro cooperation mechanism in which institutional differences drive technological complementarity and industrial upgrading. This conclusion provides a new

theoretical interpretation and practical basis for diversified and high-quality Belt and Road cooperation.

In terms of theoretical significance, the integrative «Initiative–Institution–Enterprise» analytical framework constructed in this study brings macro-level institutional arrangements, meso-level business environments and micro-level firm behavior into a unified explanatory system. This provides a more comprehensive theoretical foundation for understanding the economic effects of the Belt and Road Initiative and effectively bridges the persistent disconnect between macro-level policy initiatives and micro-level enterprise outcomes in the relevant academic literature.

In terms of practical significance, drawing on the systematic analysis of the development challenges faced by enterprises in countries along the Belt and Road and the empirical findings derived from the gravity model, this study proposes operationally feasible response strategies. These strategies can serve as practical decision-making references for government departments, industry associations and multinational enterprises, helping stakeholders to reduce the uncertainties caused by institutional complexity, thereby optimising their trade and investment decisions and contributing to the sustainable and high-quality development of the Belt and Road Initiative.

The structure of this thesis is arranged as follows. Chapter 1 elucidates the conceptual connotation, strategic significance, spatial pattern of major participating countries, and historical origins of the Belt and Road Initiative. Chapter 2 analyses the current state of enterprise development in countries along the Belt and Road from three dimensions: economic opportunities, industrial growth, and the institutional environment. Chapter 3 focuses on the infrastructure and institutional bottlenecks facing enterprises, conducts an empirical test based on an augmented gravity model, and proposes systematic response strategies along two principal lines—infrastructure investment and regional connectivity, and regulatory coordination and trade procedure simplification. The thesis concludes by summarising the principal findings and exploring their policy implications.

Chapter 1 Overview of the «One Belt and One Road» initiative

The Belt and Road Initiative (BRI) represents one of the largest-scale practices of transnational public goods provision in contemporary international economic cooperation. Its institutional connotations and strategic logic can be apprehended at three levels. First, at the conceptual level, it is essential to clarify the definitional boundaries of the BRI and its strategic positioning within global governance, elucidating its institutional attributes as a new type of international public good. Second, at the spatial pattern level, it is necessary to analyze the distributional characteristics of the major participating countries and the six economic corridors, revealing the Initiative's organizational logic centered on connectivity and its geographical coverage. Third, at the historical dimension level, a historical institutional perspective is introduced to trace the ideational shaping of the contemporary Initiative by the ancient Silk Road tradition and to discern how the phased evolution of globalization has imbued it with new contemporary meaning. The analysis at these three levels provides a foundational framework for understanding the institutional context and strategic prerequisites in which local enterprises in countries along the Belt and Road operate.

1.1 Concept and strategic significance of the initiative

The Belt and Road (B&R) refers to the collective term for the Silk Road Economic Belt and the 21st-Century Maritime Silk Road. In September 2013, President Xi Jinping delivered a speech at the Nazarbayev University in Kazakhstan, where he first put forward the initiative of jointly building the Silk Road Economic Belt. In October of the same year, he further proposed the vision of jointly building the 21st-Century Maritime Silk Road at the Indonesian Parliament [1, p. 11; 2, p. 7]. After the two initiatives were integrated into the overarching concept of «the Belt and Road», it was formally established as a major national strategy for China to promote all-round opening-up and deepen international economic cooperation [3, p. 19; 4, p. 8].

Regarding the conceptual connotation of the Belt and Road Initiative, the core principles of «extensive consultation, joint contribution, and shared benefits» do not

merely constitute a set of procedural norms but embody the inner logic of a new type of international cooperation [6, p. 34]. Some studies point out that these three principles represent the operational essence of the vision of a community with a shared future for mankind, providing both the normative foundation and the practical pathway for transcending zero-sum international relations. The Initiative takes extensive consultation, joint contribution, and shared benefits as its fundamental guiding principles, with policy coordination, facilities connectivity, unimpeded trade, financial integration, and people-to-people bond-the «Five Connectivity» pillars-as its main areas of cooperation [10, p. 17]. It aims to promote the orderly and free flow of economic factors, the efficient allocation of resources, and the deep integration of markets; to advance economic policy coordination among countries along the routes; to carry out broader, higher-level, and deeper regional cooperation; and to jointly build an open, inclusive, balanced, and universally beneficial regional economic cooperation architecture. Examining this ambition through the lens of Marx's theory of the world market reveals that, by systematically constructing transnational infrastructure networks, the Initiative consciously expands the world market in a way that prioritizes the developmental needs of late-industrializing economies, thereby creating the spatial and institutional conditions for a more equitable international division of labor [32, p. 41; 49, p. 16]. Taking the «Five Connectivity» framework as an analytical lens, the logic of each dimension's impact on local enterprises in countries along the Belt and Road reveals a pronounced structural differentiation [12, p. 18]. The core function of facilities connectivity lies in reducing logistics costs and enhancing market accessibility, thereby laying the necessary physical preconditions for local enterprises to integrate into larger external markets [20, p. 142; 40, p. 21]. From a geo-economic interpretation, by systematically compressing the «friction of distance» through cross-border infrastructure investment, the Initiative reshapes the spatial-temporal constraints that have long marginalized inland economies, enabling transit corridors to progressively transform into dynamic economic corridors that reorient economic flows. Unimpeded trade focuses on expanding export space, which is of particular practical significance for small and medium-sized enterprises (SMEs) previously constrained by the size of their domestic markets; yet at the same time, more

complex international rules and compliance requirements pose a severe test of firms' adaptive capacity [34, p. 19]. The central question addressed by financial integration is whether it can effectively narrow the financing gap faced by host-country SMEs—a dimension directly linked to whether the Initiative's inclusiveness claims can be genuinely realized [64, p. 71]. The role of the people-to-people bond is more profound: through mechanisms such as joint training and educational exchanges, it helps build the managerial capability and the skilled talent base necessary for local enterprises to engage in international competition. Some scholars note that area and country studies can play an enabling role in the process of enterprises «going global», offering theoretical and academic support for a deeper understanding of the institutional environments and cultural characteristics of countries along the Belt and Road [24, p. 23]. Cooperation under the Initiative respects the sovereignty of all countries, attaches no political conditions, does not compel any party to take sides, follows a path of pragmatic cooperation, provides development opportunities, and concentrates on infrastructure construction, connectivity, and cross-regional industrial capacity complementarity, thereby contributing to the sustainable development of all participants [47, p. 13]. Relevant studies emphasize that it is precisely this combination of openness, non-coercion, and shared benefits that distinguishes the Belt and Road Initiative from traditional aid models or hegemonic integration schemes, forming the theoretical and practical pillars of a new type of international cooperation [15, p. 7].

In terms of its strategic significance, the Belt and Road Initiative has generated far-reaching impacts at both the domestic and international levels. At the domestic level, it has accelerated the restructuring and upgrading of China's industrial sector, promoted the rapid development of tertiary industries such as finance, trade, and logistics, and advanced the in-depth implementation of regional development strategies—including the Large-scale Development of the Western Region—thereby facilitating gradient-based economic growth in China [22, p. 114; 67, p. 72]. Some studies indicate that the construction of land corridors is undergoing a continuous upgrade from «singular routes» to «interwoven networks» with the focus of construction shifting from «logistics passageways» to «economic corridors», thereby laying a solid foundation for coordinated regional

economic development. This empirical observation resonates with the geo-economic thesis that the functional core of the Initiative lies in reshaping the economic geography along the routes by embedding once-peripheral spaces into multilayered networks of production and exchange. At the international level, the BRI is committed to injecting new momentum into sustainable economic growth and cross-border trade through infrastructure investment, and to promoting the construction of an inclusive and sustainable international economic order [42, p. 18]. Observations indicate that the Initiative advances world peace and development, offering countries along the Belt and Road a new type of cooperative pathway distinct from traditional development models. Further research demonstrates that the Initiative's sustained focus on connectivity and unimpeded trade reconstructs the spatial logic of the world market in a manner that enables developing countries to transcend the asymmetric structural constraints historically embedded in the global economy, thus providing a systemic rationale for an inclusive order [49, p. 18; 32, p. 43]. The openness and inclusiveness inherent in this platform have, in essence, constructed a foundational institutional environment that enables enterprises in all participating countries to access regional production networks while preserving their own distinctive operating characteristics [55, p. 79]. As relevant studies elucidate, the vision of a community with a shared future for mankind, rooted in joint contribution and shared benefits, constructs a new form of international solidarity that accommodates diverse development paths, turning the abstract promise of shared opportunities into concrete institutional arrangements [63, p. 45; 15, p. 9].

Since its conceptual inception, the Belt and Road Initiative has roughly passed through four developmental stages. Table 1 – summarizes the timeline, landmark events, and core characteristics of each stage.

Table 1 – Development Stages and Key Milestones of the Belt and Road Initiative

Stage	Time	Landmark event	Core features
Concept Proposal Phase	September–October 2013	President Xi Jinping delivered speeches in Kazakhstan and Indonesia	Proposed the concepts of the ‘Silk Road Economic Belt’ and the ‘21st Century Maritime Silk Road’
Top-level design phase	March 2015	«Vision and Actions on Jointly Building the Silk Road Economic Belt and the 21st-Century Maritime Silk Road» Released	Clarify the ‘Five Links’ cooperation framework and the layout of six major economic corridors
Mechanism Construction Period	2017–2018	The First Belt and Road Forum for International Cooperation was held, and the Asian Infrastructure Investment Bank started operations	Construction of multilateral cooperation mechanisms, gradual improvement of investment and trade rules
Period of high-quality development	From 2019 to present	The 2nd and 3rd Belt and Road Forum for International Cooperation were held successively	From ‘bold freehand brushwork’ to ‘meticulous gongbi painting’, emphasizing green, integrity, and high standards

Source: Compiled based on official documents of the Belt and Road Forum for International Cooperation and publicly available information from the Ministry of Commerce.

Figure 1 systematically presents the evolution of the Belt and Road Initiative from 2013 to 2025 in a timeline format, clearly marking key milestone events at various stages, including concept proposal, top-level design, mechanism construction, and high-quality development. This figure mutually confirms and complements the four development stages outlined in Table 1, allowing readers to intuitively grasp the overall evolutionary trajectory and stage-specific characteristics of the Initiative.

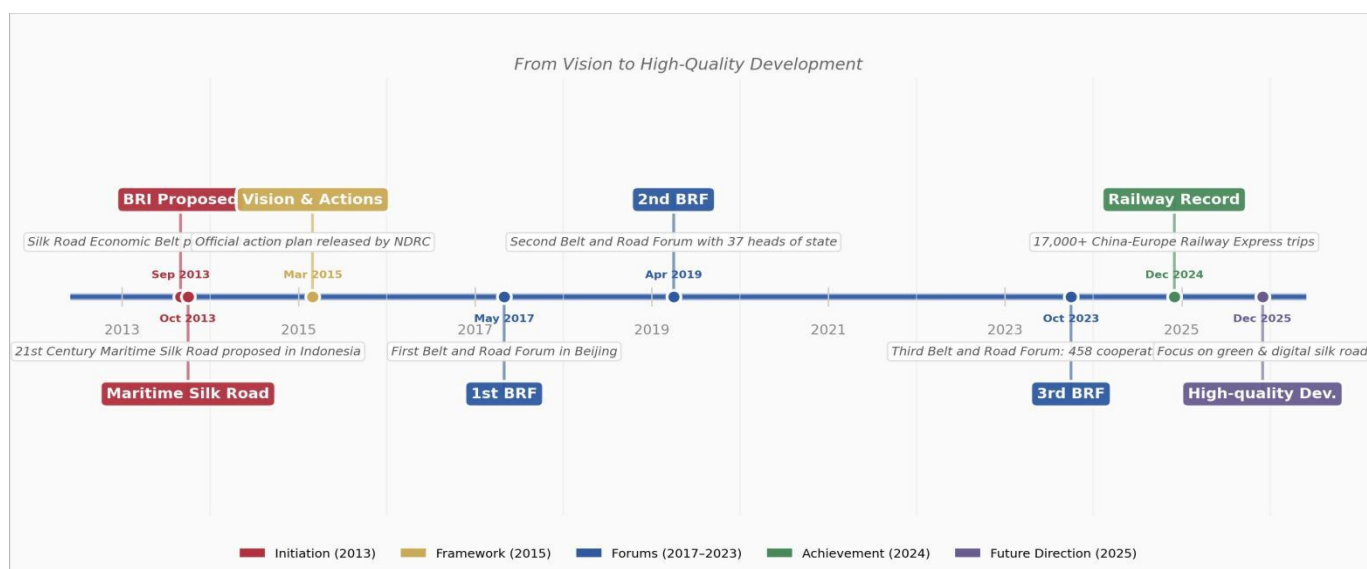


Figure 1 – Timeline of the Belt and Road Initiative (2013–2025)

Source: Author's compilation based on official BRI documents, Ministry of Commerce data, and Belt and Road Forum outcome lists.

1.2 The main participating countries and economic corridors

The Belt and Road Initiative spans a vast geographical expanse, covering Asia, Europe, Africa, and even Latin America [5, p. 24]. According to the official planning framework, its spatial architecture can be broadly delineated into «two main corridors» and «six economic corridors»-the former consists of the Silk Road Economic Belt, which traverses Central Asia and the Middle East to connect China with Europe, and the 21st Century Maritime Silk Road, which extends to Africa and Europe via key ports in ASEAN, while the latter constitutes the core skeleton linking the economic networks of the participating countries, fulfilling a composite function of industrial agglomeration, trade flows, and regional integration [65, p.23]. Table 2—systematically presents the connection scope, core countries, key cooperation areas, and progress milestones of the six economic corridors.

Table 2 – Overview of the Six Major Economic Corridors of the Belt and Road Initiative

Economic Corridor	Scope of Connection	Core Countries	Key Cooperation Fields	Progress Symbols
New Eurasian Land Bridge	Eastern China – Central Asia – Europe	Kazakhstan, Russia, Poland, etc.	Railway transportation, China-Europe Railway Express	The annual operation volume of China-Europe Railway Express exceeded 17,000 trains in 2024
China-Mongolia-Russia Economic Corridor	Northeast China – Mongolia – Russian Far East	Mongolia, Russia	Energy cooperation, cross-border transportation	The tripartite docking mechanism operates steadily
Economic Corridor	Scope of Connection	Core Countries	Key Cooperation Fields	Progress Symbols
China-Central Asia-West Asia Economic Corridor	Xinjiang of China – Five Central Asian Countries – Turkey	Uzbekistan, Iran, Turkey	Energy cooperation, industrial diversification	The China-Kyrgyzstan-Uzbekistan railway project is steadily advanced
China-Indochina Peninsula Economic Corridor	Southwest China – ASEAN – Malay Peninsula	Vietnam, Laos, Thailand, Malaysia	Railway and highway connectivity	The China-Laos Railway was officially opened and put into operation in 2021
China-Pakistan Economic Corridor	Xinjiang of China – the whole territory of Pakistan	Pakistan	Energy, transportation, Gwadar Port	The «1+4» cooperation layout has been implemented with flagship projects fully launched
Bangladesh-China-India-Myanmar Economic Corridor	Yunnan of China – Bangladesh – Myanmar – India	Bangladesh, Myanmar, India	Sub-regional cooperation, transportation infrastructure	Huge population scale, under steady advancement

Source: Compiled based on the Belt and Road Industrial Cooperation Development Report (2020–2021), the outcome list of the Belt and Road Forum for International Cooperation, and the World Bank research report Belt and Road Economics: Opportunities and Risks of Transport Corridors.

Figure 2 presents the spatial layout of the six economic corridors under the Belt and Road Initiative through geographic visualization, clearly illustrating their transcontinental alignments, major node cities, and key maritime ports (e.g., Gwadar Port, Piraeus Port). By intuitively presenting the spatial morphology of the corridors, this figure both

complements the textual description in Table 2 and provides a geographic reference for the subsequent detailed elaboration on each corridor.

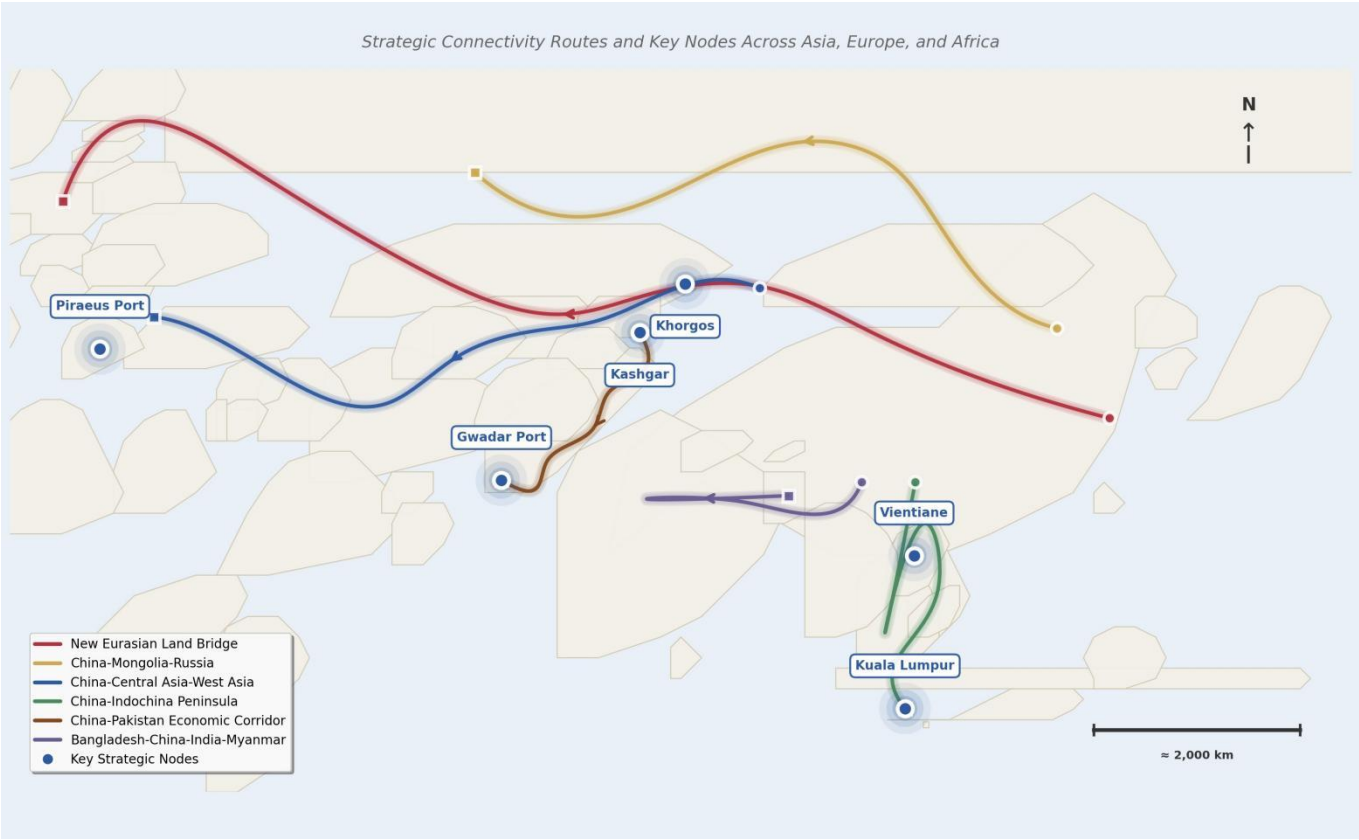


Figure 2 – Spatial Distribution of the Six Economic Corridors Under the Belt and Road

Initiative

Source: Author’s rendering based on official BRI corridor planning documents, World Bank reports, and geographic data from Natural Earth.

The specific layout of each of the six economic corridors has its own distinct emphasis, as elaborated below.

New Eurasian Land Bridge Economic Corridor. Relying on the Longhai-Lanxin Railway trunk line and the China-Europe Railway Express (CRE) network, this corridor departs from China’s eastern port cities, traverses Central Asian countries, and ultimately reaches major European economic centers, forming a major Eurasian land artery with railways as its backbone and multimodal transport as its supplement [40, p. 22; 58, p. 31]. The annual number of CRE trips exceeded 17,000 in 2024, enabling local small and medium-sized enterprises (SMEs) in node cities along the route to access multiple large

markets at both ends with a considerably lower threshold [38, p. 25].

China-Mongolia-Russia Economic Corridor. Covering Northeast China and North China and extending through Mongolia to the Russian Far East, this corridor centers on energy cooperation and cross-border transport infrastructure construction, and is the only cooperation framework among the six economic corridors built upon a trilateral cooperative institutional architecture. Research on the regional cooperation mechanism of this corridor points out that the tripartite institutional architecture has effectively facilitated the alignment of development strategies and the coordinated implementation of cross-border projects among the three countries [19, p. 27].

China-Central Asia-West Asia Economic Corridor. Starting from Xinjiang, this corridor runs through the five Central Asian countries and extends via Iran and Turkey to the Arabian Peninsula and the eastern coast of the Mediterranean [56, p. 33]. Energy development and transport cooperation have long been at the core of this corridor, yet as its construction deepens, the participating countries' demands for industrial diversification have grown increasingly urgent, and the China-Kyrgyzstan-Uzbekistan railway project is progressing steadily. A study on the geo-economic relations of this corridor suggests that the evolving economic complementarities among the participating countries are driving the corridor's transformation from a mere energy transit passage to a multi-dimensional economic corridor [54, p. 145].

China-Indochina Peninsula Economic Corridor. Originating in China's southwestern provinces, this corridor runs through Vietnam, Laos, Cambodia, Thailand, and Myanmar, extending to Malaysia and Singapore, and serves as the core overland passageway linking the Chinese and ASEAN markets [27, p. 102; 31, p. 134]. The China-Laos Railway, which commenced operations in 2021, enabled Lao local agricultural enterprises to achieve bulk cold-chain exports to the Chinese market for the first time, signaling the corridor's transition from the planning stage to substantive operation [30, p. 11].

China-Pakistan Economic Corridor. Starting from Kashgar, this corridor traverses the entire territory of Pakistan and reaches Gwadar Port. It is structured around a «1+4» cooperation layout-with the corridor construction as the center, and Gwadar Port, energy, transport infrastructure, and industrial cooperation as the four key priority areas [57, p.

58]. Ye Hui and Wu Wanxin point out that accelerating China-Pakistan industrial capacity cooperation is of strategic significance for advancing corridor construction and enhancing bilateral trade competitiveness, while the successive commissioning of energy projects has also significantly alleviated the long-standing electricity shortage constraint faced by local enterprises in Pakistan. In parallel, research on Pakistan's railway industry for this corridor highlights that upgrading the rail network is essential for improving logistics efficiency and fully realizing the corridor's economic potential.

Bangladesh-China-India-Myanmar (BCIM) Economic Corridor. This corridor connects Yunnan with Bangladesh, India, and Myanmar, and aims to advance sub-regional cooperation through transport infrastructure connectivity and trade facilitation measures. Although the corridor faces pronounced institutional coordination and financing difficulties, its economic potential upon completion is considerable [35, p. 35; 36, p. 7]. A World Bank report also assesses that the infrastructure projects of the six corridors will have far-reaching impacts on more than seventy economies along the routes.

Viewed from the dynamic evolution of its spatial morphology, the Initiative is undergoing a continuous upgrading from «singular routes» to a networked configuration of «interwoven networks.» Liu Yilei points out that over the past decade and more, the construction of land corridors has achieved a leap from «connecting lines into networks» to «empowering growth,» with the focus of construction shifting from «logistics passageways» to «economic corridors». The economic implication of this shift is that prior infrastructure investment is being translated, via enhanced market accessibility and accelerated factor mobility, into agglomeration effects enjoyed by local enterprises along the corridors [20, p. 144; 29, p. 52].

1.3 Historical aspects of the «One Belt and One Road» initiative

The conceptual foundations of the Belt and Road Initiative can be traced back to the ancient Silk Road—a transcontinental Eurasian passage that bore the composite functions of commodity exchange, technology diffusion, and cultural integration, and that stands as a major cross-regional interaction network in the history of human civilization. Some studies

suggest that the historical origin of the Silk Road carries a deep-rooted Chinese complex of external connectivity, and the contemporary Initiative embodies a creative transformation and innovative development of this historical legacy [50, p. 117; 51, p. 7].

Viewed from a historical institutionalist perspective, the continuity and evolution between the ancient Silk Road and the Belt and Road Initiative are manifested across three dimensions: the material, the institutional, and the ideational [54, p. 147]. Table 3– provides a systematic comparison across five dimensions: geographical space, modes of transport, trade content, institutional framework, and core ideas.

Table 3– Historical Continuity between the Ancient Silk Road and the Belt and Road

Initiative

Dimension	Ancient Silk Road	Belt and Road Initiative	Continuity and Innovation
Geographic Space	Mainly the hinterland of Eurasia	Expanded to a vast area covering Asia, Europe, Africa and Latin America	Great expansion in spatial scope
Means of Transport	Camel caravans, sailing ships	Railways, highways, ports, aviation, digital networks	Upgrading from flat to multidimensional
Trade Content	Luxury goods such as silk, porcelain, spices	Energy, equipment, consumer goods, digital services	From single luxury goods to full coverage
Institutional Framework	Informal trust and customary norms of caravans	Multi-level international cooperation agreements	From informal trust to institutionalized cooperation
Core Concept	Peaceful cooperation, mutual learning	Extensive consultation, joint contribution, shared benefits	Creative transformation of the Silk Road spirit

Source: Compiled from Wang Yiwei, «The World is Connected: The Logic of the Belt and Road» and public information from the Ministry of Commerce.

At the material level, both take transportation infrastructure connectivity as their operational foundation-the ancient Silk Road relied on camel caravans and sailing ships to link oasis city-states and coastal markets, whereas the contemporary Initiative employs railways, highways, ports, and digital networks to construct a multi-dimensional,

multi-layered connectivity system. Research on historical and cultural exchanges along the Silk Road further indicates that such cross-civilizational interaction accumulated rich experience in people-to-people connectivity, providing a cultural foundation for the contemporary ‘Five Connectivity’ cooperation framework [50, p. 121; 62, p. 25]. For enterprises along the routes, this leap from scattered nodal distribution to network coverage has directly resulted in a fundamental improvement in market accessibility and a structural reduction in logistics costs. At the institutional level, ancient trade exchanges depended on informal trust and customary norms among merchant caravans and lacked a unified rules system, whereas the contemporary Initiative draws on multi-layered cooperation agreements and institutional arrangements to build a binding and predictable cooperation framework [21, p. 12; 44, p. 192]. This enables the cross-border transaction behavior of enterprises along the routes to move beyond reliance on purely interpersonal trust toward rule-based institutionalized cooperation, substantially reducing uncertainty costs—a shift that is especially crucial for host-country SMEs that lack legal teams and international operational experience [33, p. 165]. At the ideational level, the Silk Road spirit of «peace and cooperation, openness and inclusiveness, mutual learning, and mutual benefit» has crystallized in the contemporary era into the principle of «extensive consultation, joint contribution, and shared benefits» providing a more inclusive value consensus for transnational economic cooperation [15, p. 10]. Notably, the historical contributions of the Grassland Silk Road, as an integral branch of the ancient Silk Road network, have provided a deep historical foundation and practical inspiration for contemporary sub-regional cooperation frameworks such as the China-Mongolia-Russia Economic Corridor.

Fu Mengzi points out that the Belt and Road Initiative aims to promote the free flow of economic factors, the efficient allocation of resources, and deep economic integration, representing a major initiative that aligns with the common interests of all countries along the routes [49, p. 19]. Proceeding from the perspective of historical materialism, Wang Yajun argues that this Initiative serves to fill a structural void in the transformation of the global governance system, embodying the historical initiative of a major power within the new global landscape. Within this framework, what enterprises in countries along the Belt

and Road gain is not merely a broader market space, but also a window of opportunity to actively participate in and shape regional economic rules. Wang Yiwei provides an in-depth exposition of this in his book «The World Is Connected: The Logic of the Belt and Road» [16, p. 14].

The historical value of the Belt and Road Initiative is also reflected in its corrective supplement to the existing model of globalization. Since the 1980s, the process of globalization has been predominantly led by advanced economies, and its institutional design has largely reflected the interests and demands of developed countries, giving rise to structural contradictions such as uneven development, inequitable distribution of benefits, and inadequate risk sharing. In contrast, the Belt and Road Initiative emphasizes an infrastructure-first and development-oriented approach, respects the development paths independently chosen by each country, and grants participants greater policy space through extensive consultation, joint contribution, and shared benefits [32, p. 45]. It thus provides an alternative pathway for reviving balanced development in globalization, while also opening up more diversified market options and cooperation networks for enterprises along the routes [47, p. 15].

Chapter 2 Current Status of Enterprise Development in OBOR countries

Having established an understanding of the macro-level institutional framework of the Belt and Road Initiative, this study now turns its analytical lens to the concrete practices of enterprise development in countries along the Belt and Road. The relationship between macro-level institutional arrangements and micro-level firm behavior is not a simple, unidirectional linear transmission; rather, their interaction and integration involve complex intermediary mechanisms and are conditioned by specific boundary conditions. This chapter proceeds along three interrelated dimensions of analysis: it examines the exogenous growth drivers and market expansion space created for enterprises along the routes by the Initiative's framework, in light of regional economic patterns and market endowments; it delineates the differentiated development paths and operational performance formed by various types of market entities as they participate in regional economic and trade cooperation, based on the morphology of industrial layout and the laws of sectoral evolution; and it focuses on the characteristics of the regional institutional environment to conduct an in-depth analysis of the institutional constraints imposed on firms' business operations by factors such as regulatory fragmentation and cross-border trade barriers. Through a systematic investigation along these three dimensions, this chapter presents an overall picture of the intertwined opportunities and constraints in the development of enterprises in countries along the Belt and Road.

2.1 Economic opportunities and market potential in OBOR countries

The countries along the Belt and Road cover a population of over 4 billion and account for roughly one-third of the global economy [11, p. 25]. This vast market space with considerable growth potential brings multiple development opportunities for enterprises along the routes, concentrated in four areas: market expansion, trade growth, investment inflows, and industrial upgrading.

In terms of market expansion, the sustained advancement of the Initiative continues to stretch the market boundaries of enterprises along the routes. As the six economic

corridors gradually become operational and connectivity levels steadily improve, regional markets that were once fragmented due to geographical barriers and weak infrastructure are being integrated at an accelerated pace. Taking Central Asia as an example, the construction of the China-Kyrgyzstan-Uzbekistan railway not only facilitates the export of production capacity from central and western China, but also opens up access for Central Asian local enterprises to the consumer markets of China's Xinjiang and the broader central and western regions, providing their high-quality agricultural and mineral products with export channels that were previously inaccessible [40, p. 23]. Local enterprises along the routes are thus able to redefine their market boundaries in a broader spatial context. In terms of trade growth, China's goods trade with Belt and Road partner countries has continued to expand. Systematic statistical tracking of China's bilateral trade and investment cooperation confirms the steady expansion of trade scale and structural optimization between China and Belt and Road economies in recent years. Table 4–reports the changes in trade scale and share from 2021 to 2025.

Table 4– China's Goods Trade Volume with Belt and Road Partner Countries (2021–2025)

Year	Total Import and Export Volume (trillion USD)	YoY Growth (%)	Share in China's Total Foreign Trade (%)
2021	2.7	-	45.3
2022	3.0	11.1	47.5
2023	2.9	-3.3	49.0
2024	3.1	6.9	50.7
2025	3.3	6.3	51.9

Source: Ministry of Commerce «14th Five-Year Plan» trade statistics, General Administration of Customs 2025 import/export press conference data, and China Belt and Road Trade and Investment Development Report 2024–2025.

The above trends carry non-negligible structural implications for local enterprises in countries along the Belt and Road. As one of the world's largest consumer markets, China's sustained expansion of imports from Belt and Road partner countries provides a continuous external demand base for the local export sector along the routes [59, p. 28]. This is particularly evident in the case of agricultural enterprises in Central Asia and electronics assembly and textile enterprises in Southeast Asia, for whom the Chinese

market has already become the most important export destination. Relevant research also confirms that the Belt and Road Initiative effectively drives the growth of local enterprises in ASEAN member states reflected by the asset scale of listed firms [13, p. 164]. The deepening of bilateral economic and trade cooperation has constructed a symbiotic development model between China and host countries, continuously releasing value chain cooperation dividends for local micro-market entities [31, p. 135; 48, p. 102].

In terms of investment inflows, the growth of China's direct investment in Belt and Road partner countries is benefiting local enterprises in host countries through three primary channels: technology spillovers, supply chain linkages, and workforce training. Zhang Yi, Wang Ting, and Zhou Pengda (2023), employing a quasi-natural experimental design based on World Bank Enterprise Survey data, find that China's outward foreign direct investment (OFDI) has a significant positive effect on the productivity of host-country enterprises along the routes, and that this effect is achieved primarily by alleviating firms' financing constraints and improving host-country infrastructure and institutional quality [61, p. 48] [66, p. 65]. Zhao Yanping et al. (2025) further find that the Initiative significantly promotes the total factor productivity (TFP) of enterprises in partner countries through channels such as rule coordination, infrastructure connectivity, trade barrier reduction, and diverse financial empowerment [20, p. 146]. In terms of industrial upgrading, Guo Ping, Hu Jun, and Qin Kaiqiang (2024), drawing on firm-level data from countries along the routes, confirm that digital empowerment serves as a buffer against external uncertainty shocks and can effectively stabilize and enhance the depth of local enterprises' embeddedness in global value chains [17, p. 132; 37, p. 77]. The empirical results of Li Jing and Zuo Anbin (2024) demonstrate that the signing of regional trade agreements significantly elevates the division-of-labor status of contracting countries in global value chains by reducing trade costs and facilitating the circulation of intermediate goods [26, p. 14]. Further research indicates that within the Belt and Road cooperation framework, the construction of a high-level external circulation system deepens the specialization of enterprises along the routes in the global division of labor, thereby generating a sustained driving effect on their technological innovation capabilities .Cross-border economic and trade cooperation under the Belt and Road framework also

promotes resource sharing and knowledge exchange, enabling collaborative innovation and technological progress among enterprises of participating countries. At the micro level, data from the World Bank Enterprise Surveys (WBES) also provide corroborating evidence for the above trends: in major partner countries such as Vietnam, Indonesia, Pakistan, and Turkey, the proportion of local manufacturing enterprises holding international quality certifications increased by an average of approximately 8 percentage points between 2015 and 2023, while the share of firms identifying inadequate infrastructure as their primary business obstacle declined by around 10 percentage points over the same period [52, p. 27] [53, p. 18]. These micro-level changes empirically echo the existing literature's finding regarding the «infrastructure improvement → productivity enhancement» link.

For local enterprises along the routes, the release of market potential is substantively manifested in the systematic reduction of two types of trade costs: the savings in physical logistics costs brought about by infrastructure improvements, and the decline in cross-border compliance costs induced by institutional reforms, which together lower the export threshold for firms [8, p. 102] [41, p. 50]. Zhang Jing et al. point out that reducing trade costs among countries along the Belt and Road is the key pathway to unlocking potential trade opportunities; Li Xiaozhong et al., employing a time-varying stochastic frontier gravity model, also confirm the significant impact of trade facilitation on bilateral trade potential [16, p. 15].

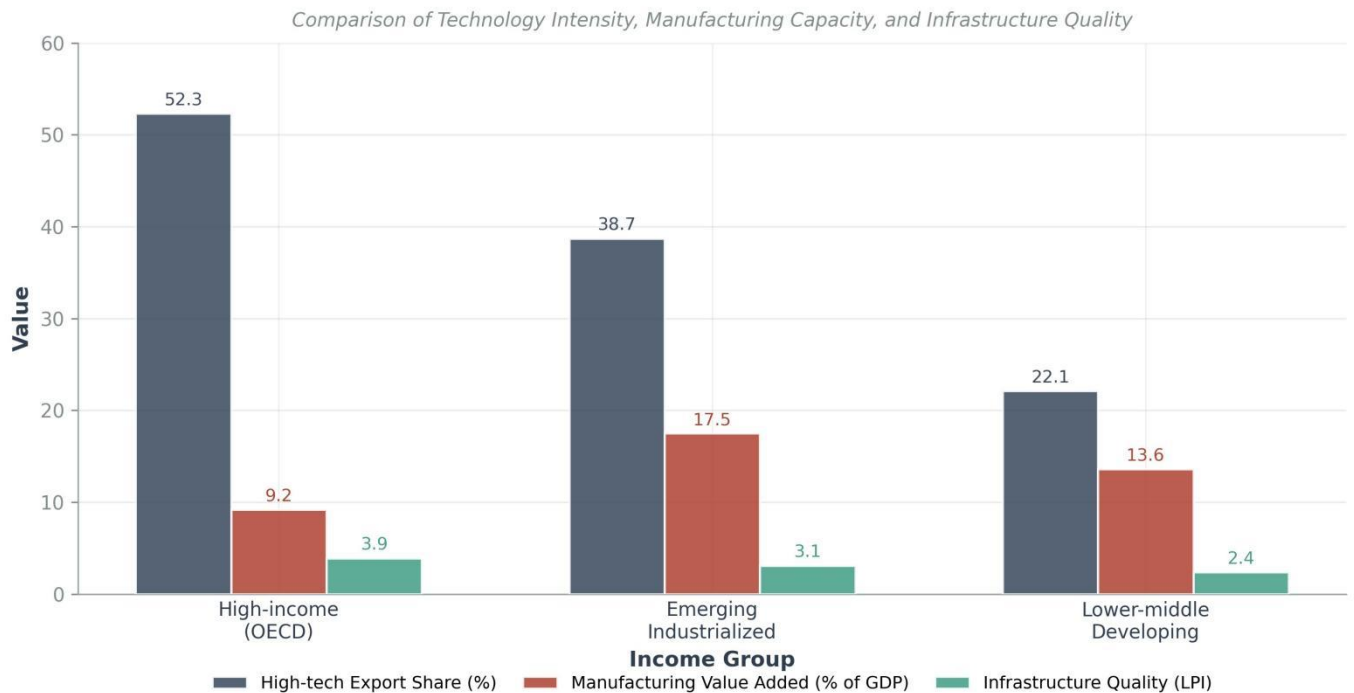


Figure 3 – Comparison of Enterprise Performance Indicators Across Income Groups

Source: Calculation based on World Bank WDI, LPI, and HTextport data (2015–2024).

Figure 3 compares the mean values of three enterprise performance indicators across high-income, emerging industrialized, and lower-middle-income developing economies along the Belt and Road: the share of high-tech exports in manufactured exports, manufacturing value added as a percentage of GDP, and infrastructure quality (LPI sub-index). As shown in the figure, high-income economies exhibit the highest level of export technological sophistication, emerging industrialized economies have the most prominent manufacturing share, while lower-middle-income developing economies lag significantly in infrastructure quality. The figure provides quantitative validation for the three-tier classification in Table 5, systematically revealing structural disparities in industrial sophistication and infrastructure endowment across income groups.

2.2 Major industries and sectoral growth trends

The industrial development of countries along the Belt and Road exhibits pronounced gradient stratification characteristics [64, p. 76]. Based on the degree of industrial structure sophistication and differences in economic development stages, these countries can be broadly classified into three categories (Table 5).

Table 5 – Industrial Development Tiers of BRI Countries

Category	Representative Countries	Industrial Structure	Key Advantage Industries	Priority Areas in BRI
High-Income Economies	Singapore, UAE, Qatar	Services >70% of GDP	Finance, Logistics, IT	Investment, Financial Services, Digital Trade
Emerging Industrialized Economies	Malaysia, Turkey	Manufacturing & Services	Equipment Manufacturing, Electronics, Automobiles	Industrial Capacity Cooperation, Technology Transfer, Industrial Parks
Lower-Middle-Income Developing Economies	Vietnam, Pakistan, Uzbekistan	Agriculture & Resource Extraction	Textiles & Garments, Mining, Agro-processing	Infrastructure, Labor-Intensive Industries

Source: Compiled based on World Bank country income classification criteria, Belt and Road Industrial Cooperation Development Report, and IMF GDP data.

High-income economies such as Singapore and the United Arab Emirates have already entered the post-industrial stage, where the service sector dominates and industrial competitiveness is relatively strong; newly industrialized economies such as Malaysia and Turkey are at a critical juncture of manufacturing transformation and upgrading; and low- and middle-income developing economies such as Vietnam, Pakistan, and Uzbekistan still have industrial structures dominated by resource extraction and labor-intensive manufacturing. This gradient pattern not only shapes the differentiated starting points for enterprises in countries along the routes, but also provides structural space for industrial capacity cooperation and industrial relocation among enterprises at different levels. The pathways of industrial upgrading display clear gradient characteristics across economies at different development levels. Low-middle-income developing economies mostly start with

labor-intensive industrial cooperation, gradually accumulating production capacity foundations and then extending into higher value-added segments; newly industrialized economies rely on the development of equipment manufacturing and electronics industries to achieve a leap in their value chain position; and high-income economies, leveraging their advantages in high-end services such as finance and digital trade, drive the coordinated industrial upgrading of other countries within the region [46, p. 15]. The basic direction of this upgrading pathway is visually presented in Figure 4.

Figure 4 demonstrates a three-stage sequential industrial upgrading pathway for enterprises participating in the Belt and Road Initiative. Specifically, the evolutionary process starts from labour-intensive manufacturing in lower-middle-income economies, transitions to technology-intensive manufacturing in newly industrialised economies, and ultimately evolves into innovation-driven service industries in high-income economies [48, p. 103]. In this schematic diagram, the vertical axis measures the value-added generated by per unit of output, and the horizontal axis represents the degree of industrial sophistication. The dashed arrows in the figure indicate the potential for industrial leapfrogging. For example, supported by tailored local policies and specific foreign direct investment layouts, certain lower-middle-income economies can directly develop digital service industries while bypassing the heavy manufacturing development stage.

From the perspective of indigenous enterprises, industrial upgrading is not confined to a fixed and predetermined developmental trajectory but constitutes a strategic endogenous choice constrained by the host economy's income level and industrial foundation. For enterprises in low-income economies, prioritising the absorption of technological spillovers from labour-intensive industrial cooperation serves as a rational initial development strategy. By contrast, enterprises in newly industrialised economies need to increase investment in research and development as well as brand cultivation, so as to facilitate their transformation and upgrading toward innovation-driven development [67, p. 74].

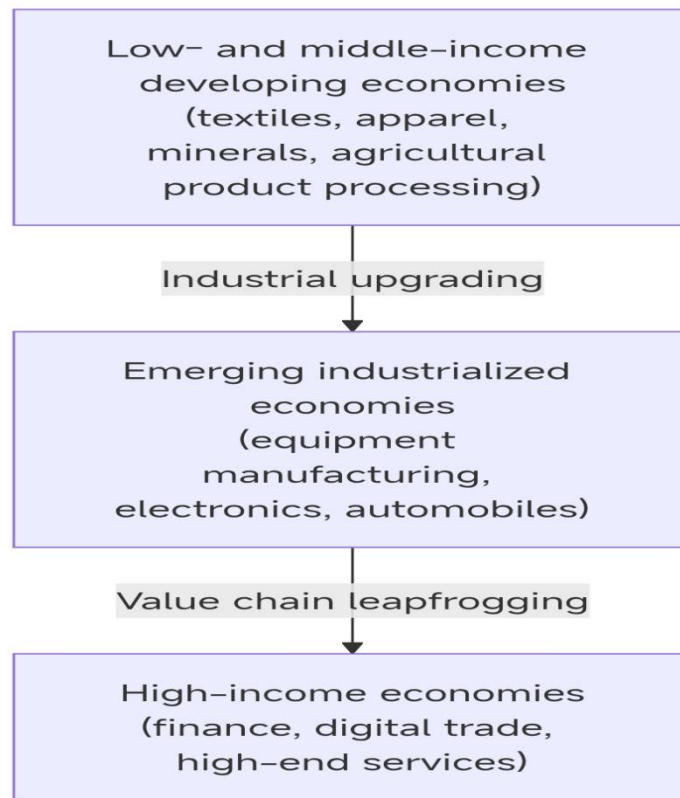


Figure 4 – Industrial Development Tiers and Value Chain Upgrading Paths in BRI

Source: Compiled based on World Bank country income classification criteria and the categorization framework of Table 5.

The direct dividends released in the infrastructure sector are most prominently reflected in the benefits accruing to local construction, building materials, and engineering service enterprises in countries along the Belt and Road [9, p. 42]. By embedding themselves in the subcontracting systems of general contracting projects, establishing joint-venture partnerships, and gaining access to localized procurement networks, these enterprises have not only expanded their business scale but also, in the process of participation, accomplished a systematic capability upgrading ranging from production technology to project management standards, with some having grown into contractors with regional competitiveness. In the manufacturing sector, the industrial capacity cooperation potential estimates by Sun Zesheng and Tao Jingjing (2020) indicate that countries such as Indonesia and Malaysia hold enormous potential for steel capacity cooperation, and local steel enterprises in these countries are transitioning from mere raw material suppliers to high-end steel manufacturers by aligning their technology and capital

with those of advanced manufacturing enterprises [46, p.17]. This process is not a simple spatial relocation of production facilities; rather, it is a composite export of «capacity + technology + management + standards» that helps propel manufacturing enterprises in countries along the routes in a gradient leap from labor-intensive to technology-intensive operations. Relevant research further confirms that China's export trade cooperation plays a core driving role in promoting technological progress and industrial upgrading among enterprises in Belt and Road participating countries, effectively facilitating the transformation of traditional labor-intensive industries toward higher technological and value-added levels [26, p. 15].

The digital transformation of traditional industries and the transition to a green economy are emerging as new growth poles for enterprise development along the routes. Liu Mingyang et al. point out that, in the context of the Belt and Road Initiative, digital transformation has had a profound impact on the high-quality development of the manufacturing sector, while Guo Ping et al. (2024) further confirm that the dynamics of stabilizing global value chain positions through the upgrading of digital tools have formed an identifiable empirical regularity among local enterprises in countries along the Belt and Road. In the energy sector, local new energy enterprises in countries such as Saudi Arabia and the United Arab Emirates are leveraging international cooperation to develop late-mover advantages in sectors such as photovoltaic and hydrogen energy, thereby providing an industrial window for avoiding high-carbon lock-in. Viewed from the perspective of the restructuring of industrial value chains, the signing of regional trade agreements (RTAs) directly elevates the division-of-labor status of countries along the routes in global value chains by reducing trade costs and facilitating the circulation of intermediate goods (Li Jing and Zuo Anbin, 2024), implying that RTAs serve as an effective institutional channel for local enterprises to embed themselves in higher value-added production segments [31, p. 138].

2.3 Regulatory fragmentation and trade barriers

If economic opportunities provide the pull for market expansion by enterprises along the routes, then regulatory fragmentation and trade barriers constitute the institutional obstacles to their development. The fragmentation of the regulatory system is manifested most conspicuously in the pronounced differences in laws and regulations among countries along the routes. Gu Enuo, Deng Chenchun, and colleagues, drawing on an empirical analysis of 547 investment arbitration cases, find that the marked disparities across countries along the routes in cultural, religious, political, legal, and economic dimensions make the identification and assessment of investment dispute risks an unavoidable and critical issue in the process of firm internationalization [18, p.98; 45, p. 138]. Viewed from the perspective of institutional economics, the essence of regulatory fragmentation is high transaction costs: in a unified domestic market environment, enterprises need only comply with a single system of legal rules, whereas within the plural institutional space along the Belt and Road, they must simultaneously contend with multiple legal systems, multiple regulatory authorities, and various enforcement standards, thereby generating a threefold accumulation of information search costs, compliance adjustment costs, and dispute resolution costs. For small and medium-sized enterprises with relatively limited financial and human resources, such fragmentation constitutes an invisible barrier more formidable than capital constraints. Li Sasa further classifies the institutional differences among countries along the routes into two dimensions-formal and informal institutions-and points out that systematic differences exist in multiple legal areas, including investment, trade, labor, environmental protection, intellectual property, and dispute resolution, thus amplifying the uncertainty of firms' transnational business operations [44, p. 195].

The unevenness of the business environment is another key manifestation of regulatory fragmentation. Research based on the World Bank's «Doing Business» indicator system shows that there are significant differences in the business environment among countries along the routes, with lower-scoring countries concentrated mainly in South Asia and West Asia. An empirical study by Chen Sheng and Guo Yong (2021)

further confirms that the quality of the host country's business environment significantly affects home-country outward foreign direct investment decisions, and that different dimensions of institutional factors have heterogeneous impacts on investment flows [6, p. 36; 7, p. 17]. Combined with the research on export-driven technological progress, differences in institutional rules will also restrict the spillover effect of cross-border trade and hinder the technological upgrading of local enterprises along the routes. Although the business environment in the vast majority of countries along the routes underwent continuous improvement between 2013 and 2019, the pace of improvement varied enormously from country to country, implying that the easing of market barriers faced by enterprises is anything but a synchronized process.

In terms of trade barriers, although tariff levels have generally declined in recent years driven by regional trade agreements, the impact of non-tariff barriers has continued to rise. Chen Xiaodie and Zhang Qingping point out that issues such as hidden market access barriers and insufficient transparency of trade policies persistently impede the advancement of trade facilitation [8, p. 104]. For local export enterprises in countries along the routes, particularly those in the agricultural and textile sectors, such hidden trade barriers-characterized by high uncertainty and the difficulty of ex ante assessment-often cause more severe welfare losses than explicit tariff barriers. The research of Cheng Yunjie and Dong Chenghui further indicates that the generally low level of trade facilitation in countries along the routes directly drives up the export costs of the relevant products [30, p. 9]. Table 6– reports a comparison of trade facilitation levels across the major regions of the Belt and Road.

It can be clearly observed from the table that Southeast Asia and Central and Eastern Europe as a whole outperform Central Asia and South Asia in terms of customs efficiency, information and communication technology (ICT), and institutional environment [21, p. 14]. Such regional disparities constitute the differentiated institutional costs that local enterprises face when entering different markets. The systematic review by Li Hailian and Li Caiyue also further confirms the significant differences among countries in the degree of customs clearance facilitation, transport and logistics infrastructure, and digital infrastructure [44, p. 197].

Table 6 – Comparison of Trade Facilitation Levels in Major BRI Regions

Region	Overall Trade Facilitation Score	Customs Efficiency	Infrastructure Quality	ICT	Institutional Environment
Southeast Asia	High	Relatively High	Moderately High	High	Moderate
Central and Eastern Europe	Relatively High	Relatively High	Moderate	High	Relatively High
West Asia and North Africa	Moderate	Moderate	Moderate	Moderate to Low	Low
Central Asia	Low	Low	Low	Low	Low
South Asia	Low	Low	Low	Moderate to Low	Moderate to Low

Source: Based on the trade facilitation measurement results in Li Hailian & Li Caiyue, Development Practices, Cooperation Foundations, and Mechanism Effects of Trade Facilitation in BRI Countries.

The overall trade facilitation score in Table 6 is calculated as the unweighted average of its four sub-dimensions. A robustness test conducted via principal component analysis (results not presented in this paper) verifies that the regional ranking remains unchanged. Nevertheless, assigning higher weights to information and communication technology development and institutional environment will enlarge the score gap between Southeast Asia and Central Asia. This finding indicates that regional disparities are more prominent in knowledge-intensive industries compared with traditional manufacturing sectors.

Figure 5 presents radar charts illustrating trade facilitation profiles across five major BRI regions along four dimensions: customs efficiency, infrastructure quality, ICT development, and institutional environment, based on the data reported in Table 6. As can be seen from the figure, Southeast Asia and Central and Eastern Europe exhibit relatively balanced and higher scores across all dimensions, indicating more mature trade facilitation frameworks; Central Asia and South Asia lag significantly in most dimensions. The figure visually highlights the pronounced regional heterogeneity in institutional conditions, facilitating an understanding of the differentiated institutional costs faced by local enterprises along the Belt and Road.

A Multi-dimensional Assessment across Five BRI Regions

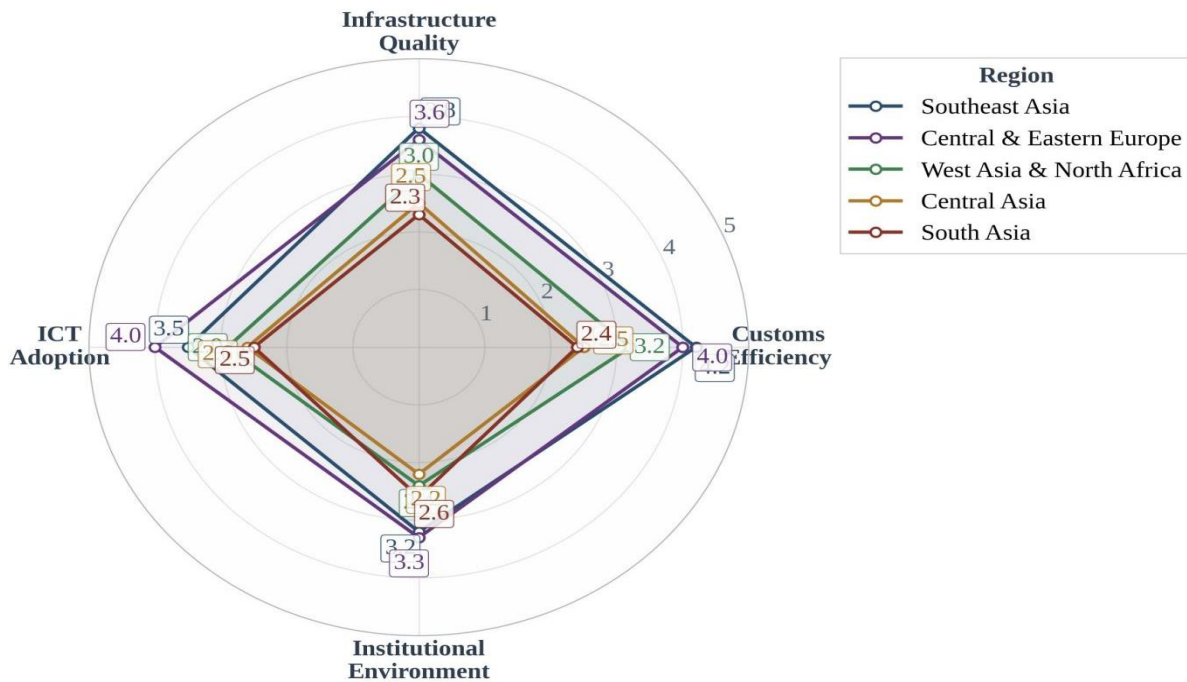


Figure 5–Trade Facilitation Profiles by Region Along the Belt and Road

Source: Visualization based on trade facilitation scores in Li Hailian & Li Caiyue (2025).

Beyond interregional comparative analysis, Figure 5 further identifies the core restrictive dimensions that primarily hinder trade development in each economic region. In Central Asia, infrastructure quality and ICT infrastructure development register the lowest indicator scores, indicating that local enterprises are plagued by excessive logistics costs and insufficient access to digital trade service platforms. For South Asia, the underperformance is mainly reflected in customs clearance efficiency and institutional governance quality, where cumbersome administrative procedures and uncertain regulatory adjustments constitute major operational obstacles for local firms. By comparison, Southeast Asia presents a relatively balanced development profile with moderate overall trade frictions; nevertheless, its mediocre institutional environment score reveals prominent deficiencies in contract enforcement efficiency and commercial dispute settlement mechanisms.

From a practical strategic perspective, this graphical evidence provides clear prioritization guidance for the market entry strategies of Belt and Road enterprises.

Specifically, firms are advised to target and remedy the most vulnerable institutional and infrastructural dimensions of host regions prior to market expansion. For instance, export enterprises targeting Central Asian markets can achieve greater marginal benefits through localized warehousing investment to offset infrastructural inadequacies, rather than merely pursuing preferential tariff policies.

Tracing the root causes of regulatory fragmentation and trade barriers, they originate in the systematic differences among countries along the routes across such dimensions as political systems, legal traditions, stages of economic development, and cultural backgrounds. The countries along the Belt and Road belong respectively to different legal traditions-civil law, common law, and Islamic law systems-and exhibit structural divergences in key institutional areas such as contract validity determination, intellectual property protection, and investment dispute resolution. From the perspective of international rule of law guarantees, Ren Wenli points out that cross-regional economic and trade activities in the context of the Belt and Road Initiative currently still face the practical dilemma of lacking effective legal support [21, p. 16]. Huang Huikang emphasizes that rule of law guarantees are the foundation and key to achieving high-quality development in the joint construction of the Belt and Road, and that institutional innovation is necessary to bridge legal conflicts. Zhu Qinqin et al. further demonstrate that the institutional distance between the host country and China has a significant negative impact on FDI attraction from China in countries along the routes [68, p. 128]. Moreover, empirical analysis based on a spatial panel model of Belt and Road countries shows that institutional distance also exerts a significant inhibitory effect on bilateral trade among countries along the routes, while the geographic adjacency effect can to some extent alleviate the trade barriers caused by institutional distance [55, p. 83].

Figure 6 plots the relationship between institutional distance (INST_KSI) and high-tech export share (HTexport) for 60 Belt and Road economies over the period 2015–2024, with a fitted regression line. The scatter plot shows a positive correlation between institutional distance and export technological sophistication, suggesting that moderate institutional differences do not hinder firm upgrading but may instead promote export structure optimization through mechanisms such as technological complementarity.

A meticulous observation of Figure 6 identifies several typical outlier samples. Specifically, certain economies exhibit high institutional distance ($INST_KSI > 5$) alongside a remarkably high proportion of high-tech exports (exceeding 70 %), with Singapore and the United Arab Emirates as representative examples [68, p. 130]. These atypical cases verify that institutional distance does not necessarily generate trade frictions. For host economies with robust technological absorption capacity and a sound legal and institutional system, institutional heterogeneity exerts a limited inhibitory effect on high-tech trade.

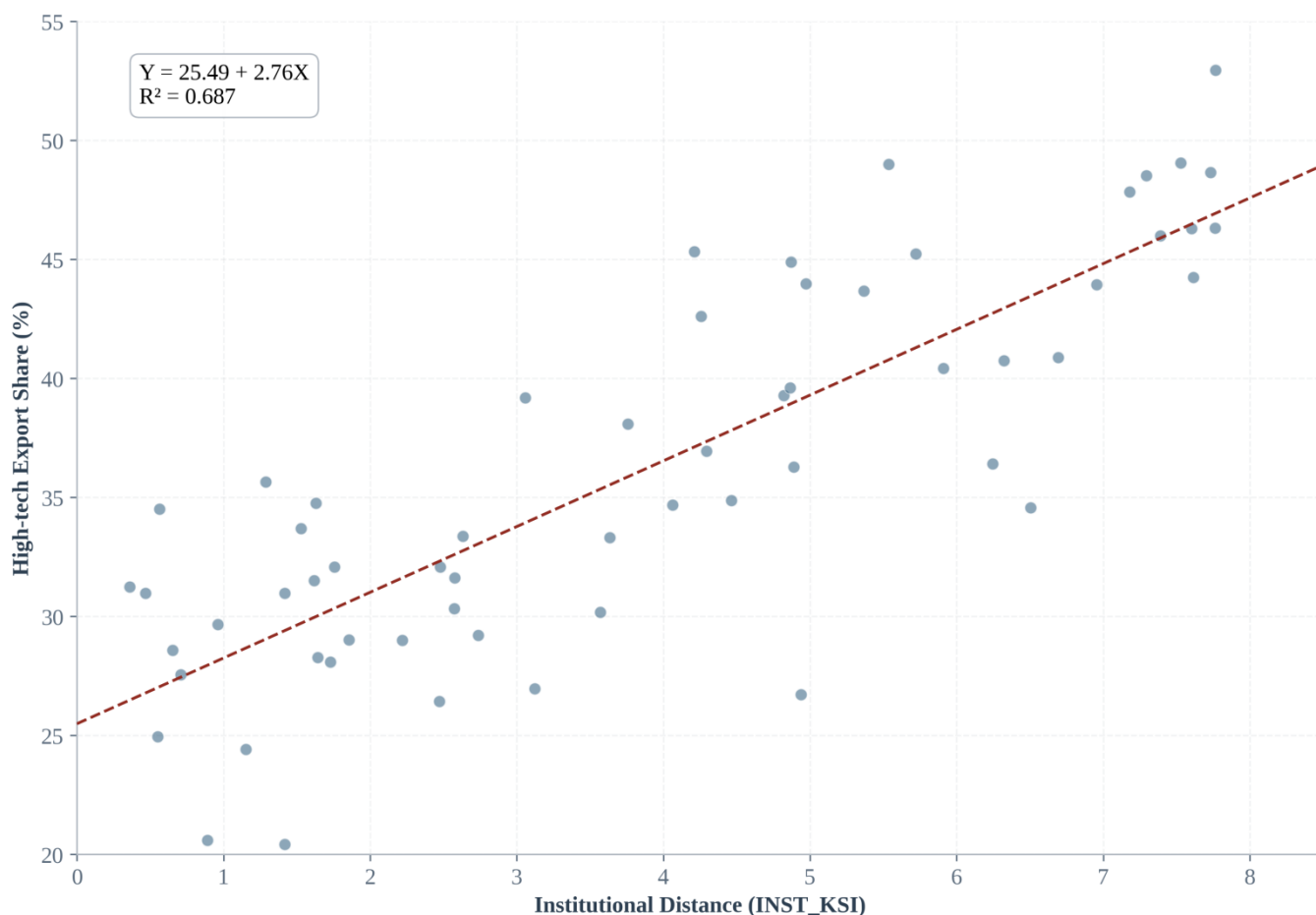


Figure 6–Institutional Distance and Export Technological Sophistication (60 BRI Economies, 2015–2024)

Source: illustration using panel data from World Bank WDI, WGI, and CEPII GeoDist.

On the contrary, several sample economies present low institutional distance ($INST_KSI < 1$) but a low share of high-tech exports (below 10 %), which are predominantly lower-middle-income economies such as Kyrgyzstan and Pakistan. This

phenomenon indicates that institutional similarity alone cannot facilitate industrial technological upgrading; the lack of supporting infrastructure and high-quality human capital will substantially restrict the development of high-tech export trade.

The fitting line of the scatter plot yields a slope coefficient of approximately 2.8 at the 1 % statistical significance level ($p < 0.01$). This graphical result is quantitatively consistent with the regression coefficient of 3.298 presented in Table 9 in the subsequent empirical analysis. The visual evidence strongly validates the counter-intuitive theoretical hypothesis of this study: institutional differences do not serve as a trade barrier. Instead, institutional distance can function as a driving factor that motivates local enterprises to acquire advanced technologies and mature management experience from technologically superior cooperative partners (represented by China) with divergent institutional environments.

It is noteworthy that the impact of institutional differences on enterprise development exhibits a pronounced asymmetric nature: large enterprises can hedge institutional risks by hiring international legal counsel, purchasing political risk insurance, and implementing diversified investment layouts, whereas SMEs are manifestly less capable of coping with the above institutional barriers. In the absence of systematic institutional coordination and risk-sharing mechanisms, the development gap among enterprises in the countries along the routes may be further exacerbated [45, p. 139].

Chapter 3 Challenges Faced by Enterprises and Corresponding Strategies

The development of enterprises along the Belt and Road has always been situated within structural conditions where economic opportunities and institutional constraints intertwine. The deep-seated barriers to sustainable enterprise development can be further traced to two interrelated dimensions: the supply deficit in physical infrastructure and the institutional governance deficit. Taking the inadequacy of infrastructure supply and obstacles to regional connectivity as its analytical point of departure, this chapter examines the formation logic of various constraining factors and clarifies their transmission mechanisms to the firm level. On this basis, an augmented trade gravity model is employed to conduct a quantitative test, measuring the direction and magnitude of the effects of different constraining variables on enterprise development. Finally, by synthesizing theoretical deductions and empirical findings, this chapter proposes systematic optimization pathways along two principal lines: one is the coordinated co-construction of infrastructure upgrading and cross-regional connectivity; the other is the alignment of cross-border regulatory rules and the optimization of trade customs clearance procedures.

3.1 Infrastructure gaps and connectivity issues

Infrastructure constitutes the material foundation for enterprise operations and market expansion, and its level of development directly affects firms' production costs, logistics efficiency, and market accessibility [10, p. 33]. However, the level of infrastructure development in countries along the Belt and Road exhibits pronounced spatial unevenness, thereby creating a prominent bottleneck that constrains enterprise development. This unevenness is visually reflected in Figure 7.

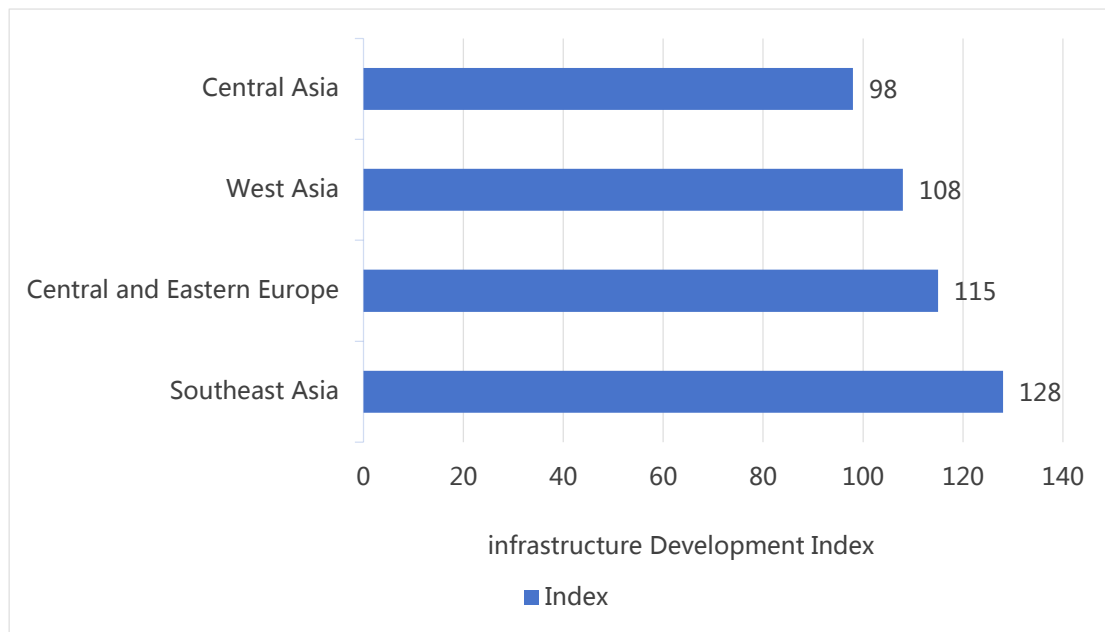


Figure 7 – Comparison of Infrastructure Development Index across Major BRI Regions

Source: China International Contractors Association & China Export & Credit Insurance Corporation, Infrastructure Development Index Report for BRI Countries (2025).

As shown in Figure 7, Southeast Asia records the highest infrastructure development index (128), followed by Central and Eastern Europe (115) and West Asia (108), while Central Asia registers the lowest (98). This regional unevenness implies that local enterprises located along different corridors face markedly different conditions in terms of both logistics costs and market accessibility, which constitutes a significant external constraint on enterprise development. It should be noted that what is employed here is the composite development index issued by the China International Contractors Association, designed to present regional disparities in an intuitive manner; by contrast, the INFRA variable used in the subsequent econometric model is drawn from the infrastructure quality sub-indicator of the World Bank's Logistics Performance Index (LPI). The two indices differ in statistical caliber but are complementary to each other.

The index scores presented in Figure 7 can be interpreted based on established industrial criteria: a 10-point discrepancy in the index approximately corresponds to a 15 %–20 % difference in average logistics costs. Accordingly, the 30-point index gap between Southeast Asia (128) and Central Asia (98) indicates that, holding other conditions

constant, manufacturing enterprises in Central Asia bear logistics costs 45 %–60 % higher than their counterparts in Southeast Asia. Such a substantial cost disparity fundamentally explains why most Central Asian firms still confine their business scope to local and regional markets, despite the connectivity enhancement effects brought by the Belt and Road Initiative.

Furthermore, although West Asia records a moderate overall index score of 108, its unobserved sub-indicators exhibit significant fluctuations driven by geopolitical uncertainties. In this context, enterprises engaged in business activities in West Asia need to incorporate not only physical infrastructure quality but also political risk premiums into their operational decision-making [39, p. 128; 43, p. 106]. This figure offers effective complementary evidence for the subsequent econometric analysis. Specifically, Figure 7 provides a static cross-regional comparative perspective on infrastructure conditions, whereas the INFRA variable embedded in the gravity model captures annual dynamic variations in national infrastructure levels. This combination enables a more comprehensive and robust evaluation of how infrastructure development affects industrial export upgrading.

The deeper challenge lies in the fact that infrastructure projects are not purely technical and engineering matters; rather, they are deeply embedded in the host country's political ecology, legal system, and social structure. Institutional frictions often amplify the uncertainty surrounding infrastructure project advancement, while the lack of physical connectivity, in turn, exacerbates the impediments that institutional barriers impose on firms' cross-border operations. In South Asia, although India, Pakistan, and Bangladesh have extremely high population densities, structural problems such as aging railways, port congestion, and unstable electricity supply persistently hamper the production capacity expansion and logistics efficiency improvement of manufacturing enterprises [1, p. 21]. Central Asia, located deep in the interior of the Eurasian continent, suffers from chronically high cross-border logistics costs for enterprises due to its geographical closure, which constitutes a natural spatial barrier for local enterprises seeking to integrate into regional and even global production networks. An assessment by Li Yuan shows that a huge gap exists between the annual demand for infrastructure investment and actual

capital input in developing countries along the Belt and Road, and that this structural undersupply of capital has become the core bottleneck hindering infrastructure improvement [35, p. 39].

Institutional distance-the differences among countries along the routes in such dimensions as legal systems, policy environments, and governance quality-profoundly affects the implementation and operation of infrastructure projects. When collaborating with international contractors, host-country local suppliers face such hidden institutional frictions as divergent interpretations of contract terms and ambiguous paths of dispute resolution, which directly drive up the transaction costs of their participation in regional cooperation. Lu Feng and Pan Songlijiang point out that Belt and Road infrastructure investment confronts deep-seated challenges, including imbalanced spatial distribution, low investment efficiency, and insufficient willingness of private capital to participate, and that a «four-wheel drive» advancement mechanism is needed to address these issues [36, p.12]. Drawing on the theoretical framework of new economic geography, improvements in transport infrastructure reshape firms' behavioral choices and development trajectories through three mechanisms: the market accessibility effect, the factor mobility effect, and the knowledge spillover effect. Hong Junjie and Zhan Qianyu (2021), based on a mediation analysis of trade costs, find that BRI facilities connectivity significantly reduces the trade costs of firm exports, thereby exerting a notably positive pulling effect on firm exports [23, p. 53]; Luo Fang et al.'s study also confirms the significant positive impact of the quality of transport infrastructure in countries along the routes on trade [58, p. 33]. Further research focusing specifically on transport infrastructure in Belt and Road countries confirms that improvements in road and rail connectivity significantly boost trade flows, with particularly pronounced effects for landlocked economies. In addition, the interaction between facility connectivity and enterprise technological innovation has been shown to generate positive synergistic effects on export value added, indicating that the benefits of connectivity extend well beyond cost reduction to encompass qualitative upgrading of export structures. Pan Yue, from the dual perspective of securitization and infrastructuralization, points out that infrastructure projects must seek a dynamic equilibrium through precise risk identification, flexible strategic adjustment, and effective

interest coordination, so as to maximize development benefits while minimizing security risks [39, p. 130].

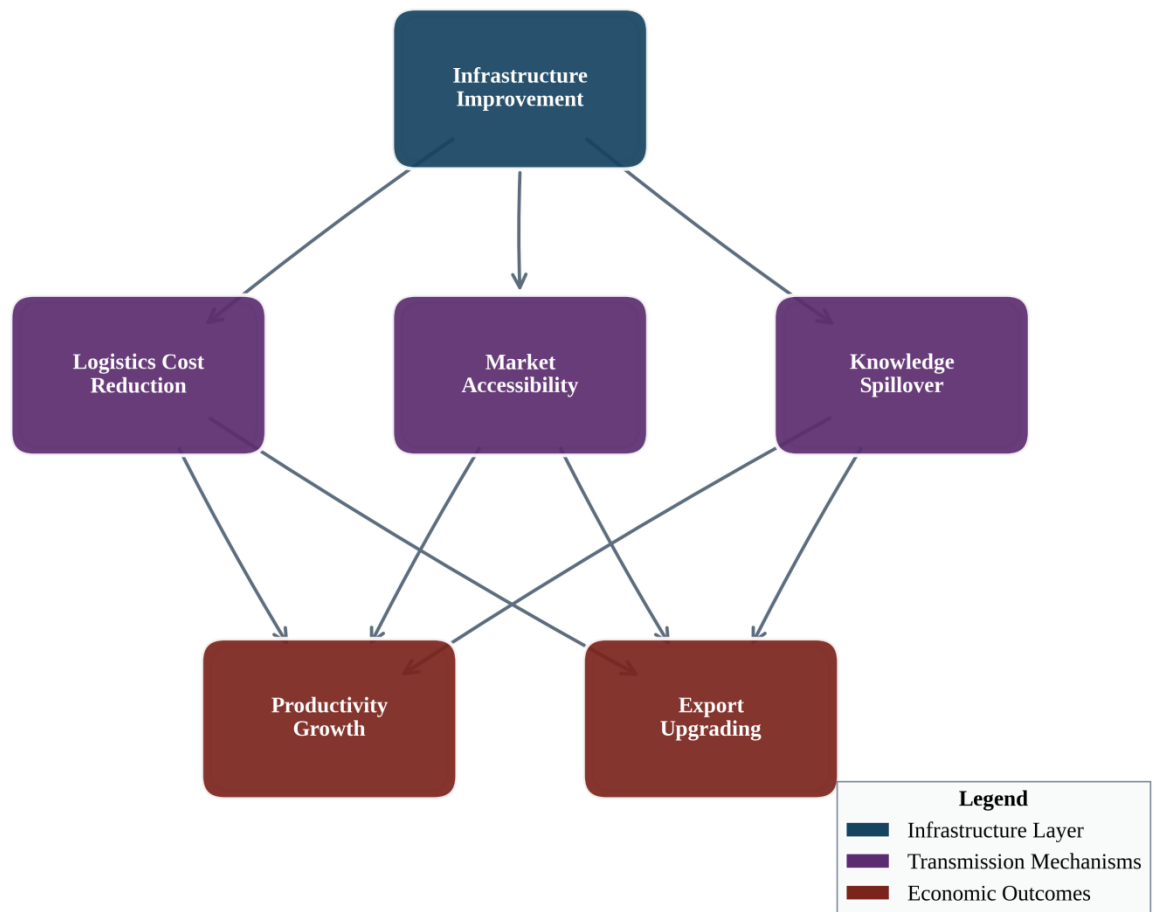


Figure 8 – Transmission Mechanism from Infrastructure to Enterprise Development

Source: Analytical framework of market accessibility, factor mobility, and knowledge spillovers in new economic geography; trade cost reduction effects of facility connectivity.

Figure 8 illustrates the multi-channel transmission mechanism through which infrastructure improvement drives enterprise development. Enhanced infrastructure quality promotes firm productivity growth and export technological upgrading via three intermediary channels: logistics cost reduction, improved market accessibility, and increased knowledge spillovers. The diagram systematically summarizes the theoretical framework and provides an intuitive logical path for understanding the indirect effects of infrastructure variables on firm performance in the empirical model.

The three influence channels presented in Figure 8 correspond to empirically

testable research hypotheses, which will be indirectly verified via the gravity model in subsequent analysis. The first channel refers to the effect of logistics cost reduction, represented by the infrastructure variable (INFRA). Improved infrastructure effectively cuts trade costs and raises the likelihood of high-tech product exports. The second channel is market accessibility, reflected by the positive coefficient of $\ln GDP$, indicating that economies with larger market scales are more appealing to high-tech and high-value-added export businesses. The third channel is the knowledge spillover effect, proxied by the institutional distance variable (INST_KSI). Its significant positive correlation with export upgrading demonstrates that cross-institutional learning can offset the inadequate direct contribution of infrastructure and facilitate the advancement of export structure.

Furthermore, this mechanism framework reveals a circular feedback effect. As local enterprises accomplish technological upgrading, they generate greater demand for high-quality infrastructure, such as stable power supply for precision manufacturing, which in turn drives the continuous improvement and investment of regional infrastructure.

Empirical Analysis of the Gravity Model:

Building on the qualitative analysis, this section constructs an augmented trade gravity model to systematically test the magnitude and direction of the effects of infrastructure level, institutional distance, and BRI intensity on industrial upgrading in countries along the routes. The dependent variable is the share of medium- and high-tech product exports in manufactured goods exports (HTexport), which reflects the technological sophistication of a country's enterprise exports; data are sourced from the World Bank's World Development Indicators (WDI) database. The core explanatory variables include economic scale ($\ln GDP$), population size ($\ln POP$), geographical distance ($\ln DIST$, sourced from the CEPII GeoDist database), infrastructure quality (INFRA, based on the LPI infrastructure sub-indicator and extended to annual data via linear interpolation, institutional distance (INST_KSI, calculated using the Kogut-Singh index based on the six dimensions of the Worldwide Governance Indicators), and BRI intensity (BRI_intensity, a time-varying binary variable, with data sourced from the Belt and Road Portal). The sample covers 60 countries along the routes, spanning the period from 2015 to 2024.

The baseline regression equation is specified as follows:

$$HTexport_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln POP_{it} + \beta_3 \ln DIST_i + \beta_4 INFRA_{it} \\ + \beta_5 INST_KSI_{it} + \beta_6 BRI_intensity_{it} + \varepsilon_{it}$$

where the subscript *ii* denotes the country and *tt* denotes the year. Table 7– reports the descriptive statistics of the core variables.

Table 7 – Variable Relationships in the Augmented Gravity Model

Variable	Type	Description	Data Source
lnGDP	Independent	Economic scale (log GDP)	WDI
lnPOP	Independent	Population size (log)	WDI
lnDIST	Independent	Geographic distance (log)	CEPII GeoDist
INFRA	Independent	Infrastructure quality (LPI sub-index)	World Bank LPI
INST_KSI	Independent	Institutional distance (Kogut-Singh index)	WGI
BRI_intensity	Independent	BRI cooperation agreement (dummy)	BRI Portal
HTexport	Dependent	High-tech export share (%)	WDI

Source: World Bank World Development Indicators (WDI) database; CEPII GeoDist database; Logistics Performance Index (LPI) infrastructure sub-indicator; Worldwide Governance Indicators (WGI) six dimensions; Belt and Road Portal cooperation agreement information

Table 7– lists the name, type, brief description, and data source of each variable employed in the augmented gravity model. The dependent variable is the share of high-tech exports in manufactured exports (HTexport), which measures the export technological sophistication of countries along the Belt and Road. The core explanatory variables include economic scale (lnGDP), population size (lnPOP), geographic distance (lnDIST), infrastructure quality (INFRA), institutional distance (INST_KSI), and BRI cooperation intensity (BRI_intensity). All variables are sourced from publicly available databases, and their definitions and measurement methods follow the conventions established in the existing literature.

All explanatory variables except lnDIST are time-varying, so country fixed effects can be adopted to eliminate the influence of unobserved time-invariant individual heterogeneity. The dummy variable of BRI intensity also changes over time, as relevant countries signed Belt and Road cooperation agreements in different years (for instance,

Pakistan in 2015 and Saudi Arabia in 2017). Such characteristics generate quasi-experimental variations and facilitate empirical identification.

Table 8–: Descriptive Statistics of Key Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
HTexport (%)	480	36.69	21.17	0.31	81.19
MFGshare (% of GDP)	589	14.34	5.41	4.24	27.81
lnGDP	600	25.50	1.37	22.62	28.99
lnPOP	600	16.70	1.54	14.09	21.10
lnDIST	600	8.69	0.49	7.07	9.87
INFRA (LPI sub-index)	572	2.82	0.62	0.57	4.87
Variable	Obs	Mean	Std. Dev.	Min	Max
INST_KSI	600	1.57	1.31	0.13	8.09
BRI_intensity	600	0.78	0.41	0	1
LPI (overall)	572	2.95	0.51	0.91	4.45

Notes: HTexport = Medium and high-tech exports as a share of manufactured exports; MFGshare = Manufacturing value added as a share of GDP; lnGDP = Natural logarithm of nominal GDP (current US\$); lnPOP = Natural logarithm of total population; lnDIST = Natural logarithm of geographic distance from Beijing to the capital city; INFRA = Infrastructure quality (LPI sub-index), interpolated across survey years; INST_KSI = Kogut-Singh institutional distance index relative to China; BRI_intensity = Dummy variable (1 = signed BRI cooperation agreement); LPI = Logistics Performance Index overall score. Sample period: 2015–2024. Data sources: World Bank WDI, WGI, LPI; CEPII GeoDist; China’s Belt and Road Portal.

Table 8 shows that the mean of HTexport is 36.69 %, but its standard deviation reaches as high as 21.17, indicating significant heterogeneity among countries along the routes in terms of export technological sophistication. The mean of institutional distance is 1.57, with a standard deviation of 1.31, suggesting that the institutional differences

between host countries and China also display considerable cross-country variation. The mean of BRI intensity is 0.78, meaning that approximately 78.33 % of the country-year observations are in a state where a Belt and Road cooperation agreement has been signed, and the time-varying nature of this variable provides the necessary policy shock variation for model identification.

The standard deviation of the high-tech export share (HTexport) reaches 21.17, with its mean value standing at 36.69. This large deviation reflects pronounced cross-country heterogeneity, thereby supporting the adoption of fixed-effects or random-effects estimation. The institutional distance index varies from 0.13 (Vietnam) to 8.09 (Uzbekistan in the early sample period), covering scenarios ranging from high institutional similarity to substantial institutional divergence.

Considering that the model includes a time-invariant distance variable, the baseline analysis employs a random-effects model. Table 9– reports the stepwise regression results, from the specification containing only the basic gravity variables to the full model that progressively introduces infrastructure quality, institutional distance, and BRI intensity.

The estimation results show that economic scale remains positive across all models and passes the significance test at least at the 5 % level in the first three models, confirming that market size is a fundamental driver of firms' technological upgrading. The coefficient of infrastructure quality is positive in all columns but fails to attain statistical significance, which may be attributable to the non-annual nature of the LPI data-after interpolation, it cannot fully capture within-group variation, thus weakening estimation efficiency.

Table 9–: Baseline Regression Results (Dependent Variable: HTextport)

Variable	(1)	(2)	(3)	(4)
lnGDP	4.151*** (1.562)	4.095** (1.596)	3.384** (1.591)	2.759 (1.703)
lnPOP	-3.577* (1.883)	-3.322* (1.898)	-2.150 (1.922)	-1.735 (1.969)
lnDIST	3.798 (4.985)	3.522 (4.949)	3.327 (4.966)	3.754 (5.002)
INFRA		1.068 (1.241)	1.026 (1.222)	1.177 (1.231)
INST_KSI			3.235*** (0.900)	3.298*** (0.903)
BRI_intensity				0.958 (0.949)
Constant	-42.202 (53.190)	-45.573 (53.086)	-50.210 (53.239)	-46.195 (53.559)
Observations	480	458	458	458
R ² (overall)	0.001	0.002	0.026	0.029
Number of countries	60	59	59	59

Notes: Random-effects GLS estimates. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. All models include year fixed effects. The mean variance inflation factor (VIF) is 3.11, and no individual VIF exceeds 10, indicating that multicollinearity is not a serious concern. The standard Hausman test was not positive definite; both random-effects and fixed-effects specifications are reported, and the core findings remain consistent across both estimators.

Institutional distance represents the most robust finding of this study: the variable is highly significant at the 1 % level in both Models (3) and (4), with a coefficient of approximately 3.3, indicating that the institutional difference between the host country and China does not constitute an impediment to firms' technological upgrading but is, to a certain extent, associated with an increase in export technological sophistication. This is consistent with the theoretical logic of «difference-driven upgrading»—in countries with greater institutional differences, local enterprises may rely more heavily on technological cooperation and market channels with China, thereby accelerating export structure

upgrading. The BRI intensity coefficient is positive but does not pass the conventional significance level, suggesting that under the baseline specification, the trade-promoting effect of the BRI has not yet fully manifested in the domain of high-tech product exports. Overall, the explanatory power of the model improves stepwise from Model (1) to Model (4), with the R-squared rising from 0.001 to 0.029. The variance inflation factors of all variables are well below 10, indicating that no serious multicollinearity problem exists.

The R-squared values range from 0.001 to 0.029, which is a common feature of cross-country panel regressions with a large sample size (480 observations) and a limited set of explanatory variables. A low R-squared does not negate the validity of the estimated coefficients. It merely suggests that the variations in high-tech export share (HTexport) are largely attributable to country-specific factors excluded from the model, such as historical industrial policies. The gradual rise in R-squared from Model (1) to Model (4) verifies that the newly incorporated variables, namely INFRA, INST_KSI and BRI_intensity, jointly improve the model's explanatory power.

To ensure the reliability of the baseline findings, Table 10– reports the results of three sets of robustness checks: replacing the dependent variable with the manufacturing value added share (MFGshare), re-estimating with a fixed-effects model, and substituting the Logistics Performance Index composite score (LPI) for the infrastructure quality sub-indicator (INFRA).

The robustness check results presented in Table 10-strongly support the baseline findings. Across all specifications, institutional distance remains positive and statistically significant at the 1 % level, with coefficients ranging from 0.65 to 3.53, confirming the robust promoting effect of institutional differences on the export upgrading of host-country enterprises. The coefficient of BRI intensity is consistently positive across specifications and passes the significance test at the 1 % and 10 % levels in the manufacturing-value-added-share model and the fixed-effects model, respectively, indicating that deepening Belt and Road cooperation exerts a positive driving effect on industrial upgrading in countries along the routes, although its statistical significance displays some sensitivity to model specification. Overall, the core findings of the baseline regression are strongly supported across all robustness checks.

Table 10- Robustness Checks

Variable	Baseline (RE)	Alternative DV (MFGshare)	Fixed Effects	LPI vs. INFRA
lnGDP	2.759 (1.703)	-1.346*** (0.384)	-0.197 (1.722)	3.510** (1.592)
lnPOP	-1.735 (1.969)	2.193*** (0.441)	-10.276 (8.961)	-2.463 (1.954)
lnDIST	3.754 (5.002)	-1.262 (1.100)	-	3.843 (4.955)
INFRA	1.177 (1.231)	0.272 (0.248)	0.437 (0.332)	-
LPI	-	-	-	-1.963 (2.020)
INST_KSI	3.298*** (0.903)	0.646*** (0.185)	3.527*** (0.951)	3.357*** (0.901)
BRI_intensity	0.958 (0.949)	0.511*** (0.183)	1.679* (0.896)	0.766 (0.957)
Observations	458	561	458	458
R ² (overall)	0.029	0.091	0.037	0.035
Estimation	RE	RE	FE	RE

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Column (1) reproduces the baseline specification (Model 4) from Table 3-2. Column (2) replaces the dependent variable with manufacturing value added as a share of GDP (MFGshare). Column (3) re-estimates the baseline model using fixed effects (FE). Column (4) substitutes the infrastructure quality index (INFRA) with the overall Logistics Performance Index (LPI).

As shown in Table 10, the institutional distance variable (INST_KSI) maintains statistical significance across all four model specifications, with its coefficient ranging from 0.646 (when MFGshare is adopted as the dependent variable) to 3.527 under the fixed-effects framework. This numerical interval carries clear economic implications: a one-unit rise in institutional distance corresponds to an increase of 0.65 to 3.5 percentage points in the manufacturing output share or high-tech export share, varying across different model settings. The strong robustness of this estimation result firmly rejects the null hypothesis that institutional distance hinders enterprise upgrading within the Belt and Road context.

3.2 Enhancing infrastructure investment and regional connectivity

The improvement in infrastructure supply and the enhancement of regional connectivity efficiency constitute the fundamental material prerequisite for alleviating various operational and developmental difficulties encountered by market entities and enterprises operating across economies along the Belt and Road routes. In the context of cross-border economic and trade cooperation, physical infrastructure acts as a vital link that connects geographically separated markets, facilitates the flow of goods, capital, technology and labor, and underpins the normal operation of industrial chains and supply chains. For a long time, insufficient infrastructure stock and low connectivity efficiency have become prominent restrictive factors that push up comprehensive operational costs, narrow market development space and hinder the long-term growth of local enterprises in participating countries. Against this backdrop, carrying out in-depth innovation of investment and financing mechanisms for infrastructure projects, alongside the scientific optimization of overall regional connectivity spatial patterns, have gradually evolved into two core and indispensable strategic directions to break the aforementioned development bottlenecks and unleash the potential of regional economic cooperation [25, p. 18].

The key to effectively bridging the widespread infrastructure financing gap that prevails across most regions along the routes lies in systematically constructing a multi-dimensional, diversified and resilient investment and financing landscape tailored to the characteristics of cross-border infrastructure projects. Infrastructure initiatives within international cooperation frameworks generally feature enormous upfront capital input, lengthy construction cycles, relatively slow capital turnover and prominent public welfare attributes, which determine that such projects cannot rely on a single financing mode for sustainable progress [35, p. 41]. The traditional development model that places excessive reliance on direct government fiscal appropriation and credit loans provided by policy-oriented development finance institutions has gradually revealed inherent limitations and inadequate long-term sustainability under the current scale of regional cooperation. Over-dependence on public finance will not only continuously increase the fiscal burden of host country governments, but also restrict the overall scale and

construction progress of infrastructure development, thus forming a vicious cycle that constrains regional economic vitality. Therefore, there exists an urgent practical demand to fully introduce market-oriented operational mechanisms and encourage extensive participation from diverse social capital. Through the joint efforts of multiple stakeholders, it is possible to build a modern investment and financing architecture comprehensively characterized by «government guidance, market operation, and international cooperation», which can effectively disperse investment risks, expand capital sources and match the diversified capital demands of different types of infrastructure projects.

In terms of continuously broadening diversified financing channels for infrastructure construction, full play ought to be given to the macro-guiding effect and capital leveraging capacity of major multilateral financial institutions dedicated to supporting global infrastructure development. Representative organizations in this regard include the Asian Infrastructure Investment Bank (AIIB), the Silk Road Fund, and the BRICS New Development Bank. These professional multilateral financial platforms possess abundant capital reserves, mature project evaluation systems and rich practical experience in cross-border investment and risk management, enabling them to guide global high-quality capital to flow into key infrastructure sectors along the routes through medium and long-term low-interest loans, equity investment and comprehensive project guarantee services. Meanwhile, relevant authorities and project operators need to further promote the standardized development of public-private partnership (PPP) projects in the field of infrastructure. The PPP model can integrate the respective strengths of public sectors and market participants, improve the overall operational efficiency of projects throughout their life cycle, and fully mobilize social resources to provide solid financial support for the steady advancement of cross-border infrastructure construction [9, p. 47].

More critically, the overall design of infrastructure investment and financing mechanisms must fully embed inclusive development concepts centered on «empowering host-country enterprises», so as to ensure that infrastructure cooperation can deliver tangible benefits to local market players and realize mutual benefit and win-win results between cooperating parties. In the specific implementation process, the actual participation degree of local small and medium-sized enterprises (SMEs) in host countries

can be set as one of the important assessment conditions for project loan approval, which creates stable business opportunities and revenue sources for local SMEs that occupy a dominant position in the regional market [66, p. 70]. In addition, relevant contractors undertaking infrastructure projects are required to formulate detailed and executable implementation plans covering multiple key links, including localized subcontracting arrangements, orderly cross-border technology transfer mechanisms, and systematic professional training for local employees [60, p. 12]. Technology diffusion and personnel capacity building serve as core approaches to realizing endogenous capability growth of local enterprises and industries, which can help host regions master advanced construction technologies, mature management models and professional vocational skills, and lay a solid technical and talent foundation for the subsequent operation, maintenance and iterative upgrading of infrastructure projects [61, p. 53].

Sound institutional design and robust rule-of-law guarantees are essential to standardize the whole process of cross-border infrastructure investment behaviors and ensure that infrastructure cooperation can effectively serve the high-quality development of host-country enterprises as well as the in-depth integration of regional economies across participating nations. Cross-border infrastructure investment and project operation involve multiple legal jurisdictions, disparate regulatory standards and complex interest relationships among different parties. A complete and well-implemented rule-of-law system can clearly define the rights, obligations and liability boundaries of all participants, standardize operational procedures in each stage of projects, resolve potential disputes in advance, and foster a stable, transparent and predictable institutional environment for large-scale infrastructure investment activities. Talent cultivation and industrial-educational integration also provide essential intellectual and human resource support for the sustainable and high-quality development of Belt and Road infrastructure cooperation and industrial empowerment [60, p. 14]. The construction, operation and supporting industrial development of modern infrastructure require a large number of interdisciplinary professionals engaged in engineering technology, project management, cross-cultural communication and international business. Deepening the integration of industry and education can connect talent training objectives with the actual demands of

regional cooperation, make up for the widespread talent shortage in many participating regions, and provide lasting soft power support for the long-term development of infrastructure and related industries.

Only in this way can infrastructure investment be sublimated from a simple behavioral measure aimed merely at «filling the infrastructure gap» in hardware facilities into a comprehensive institutional lever that effectively drives the sustained capability growth of local enterprises in host countries. This innovative operational mechanism of «promoting capability through investment» fully echoes the core research findings derived from the gravity model in international trade and economics. Relevant theoretical and empirical studies have verified that the synergistic improvement of physical infrastructure conditions and supporting institutional systems exerts a far more prominent driving effect on the overall upgrading of host-country local enterprises than the independent advancement of either single dimension [21, p. 33]. Any one-sided emphasis on hardware construction while ignoring institutional matching, or excessive focus on institutional improvement without adequate infrastructure support, will greatly weaken the comprehensive effectiveness of regional cooperation and fail to fully release the development potential of local enterprises.

At the level of transnational economic corridor construction, the overland corridors distributed along the Belt and Road routes are confronted with an inevitable development trend of accelerating their comprehensive upgrading from isolated «singular routes» to interconnected «interwoven networks». In the early stage of regional cooperation, most land corridors were positioned as simple transportation lines, with loose connection between different routes and low efficiency of resource sharing [54, p. 149]. With the continuous expansion of cross-border trade scale and deepening of industrial linkage demands, the traditional linear transportation mode can no longer adapt to the complex needs of factor flow and industrial cooperation. Taking a group of major backbone corridors as the basic framework, including the New Eurasian Land Bridge, China-Mongolia-Russia Economic Corridor, and China-Pakistan Economic Corridor, all participating parties need to make vigorous and targeted efforts to identify and break through various «last mile» bottlenecks in the transportation network [16, p. 17]. These

bottlenecks usually involve imperfect border supporting facilities, inconsistent customs clearance efficiency and disconnected branch lines, which greatly restrict the overall circulation efficiency of main corridors. Solving these practical problems can facilitate the pivotal strategic shift of land corridors from single-functional «logistics passageways» dedicated purely to goods transportation to multi-value composite «economic corridors» that integrate commodity circulation, industrial agglomeration, factor allocation and service guarantee.

Liu Yilei points out that the construction of land corridors along the routes has already accomplished a remarkable leap from the basic goal of «connecting lines into networks» to the higher-level objective of «empowering growth» for regional industries and enterprises. This evolutionary process reflects the continuous enrichment of the functional connotation of economic corridors and the gradual deepening of regional cooperation strategies. In view of this development trend, the overall planning philosophy for corridors also needs to undergo a fundamental transition from the original fragmented, project-centric construction mode to a scientific «network plus hub» integrated development model. The decentralized project-based construction mode lacks unified top-level overall planning, which easily leads to repeated construction of facilities, idleness of resources and disconnection between functional areas. In contrast, the «network plus hub» model regards the entire corridor system as an organic whole, takes key node cities and comprehensive logistics hubs as core carriers, and links all branch lines and supporting projects to form an orderly and efficient network system [36, p. 17].

Based on this planning concept, export processing zones and special economic zones can be reasonably planned and constructed around major corridor nodes. These node areas generally possess superior geographical locations, relatively complete supporting infrastructure and certain industrial foundations, which are highly suitable for undertaking industrial transfer and export processing businesses. The layout of specialized parks around logistics hubs can effectively attract domestic small and medium-sized manufacturing enterprises to gather here. These enterprises are able to take full advantage of the prominent low transport costs brought by convenient corridor connectivity, and thus seamlessly plug into the complex regional industrial chains and global value chains. The

agglomeration of upstream and downstream related enterprises in parks can also form a complete supporting industrial ecosystem, reduce the transaction and cooperation costs of individual enterprises, and further enhance the overall industrial competitiveness of the regions where corridor nodes are located [65, p. 31].

It is an objective fact that there are obvious differences in geographical environment, economic foundation, fiscal capacity and development priorities among various regions along the routes, which directly leads to significant heterogeneity in the overall infrastructure development level of the six major economic corridors within the Belt and Road framework. The empirical research by Zhao Sai also indicates that the degree of infrastructure development varies significantly among the six economic corridors: the New Eurasian Land Bridge Economic Corridor enjoys a long construction history, extensive participation of countries and active trade activities, and therefore ranks first in terms of total trade volume and infrastructure maturity [64, p. 82]. By comparison, restricted by complex geographical conditions and relatively weak economic foundations, the infrastructure supporting capacity of the China-Pakistan Economic Corridor and the BCIM Economic Corridor remains relatively backward. Such unbalanced development status across different corridors objectively dictates that relevant management departments must abandon the uniform construction standard and promotion rhythm [38, p. 30]. Instead, differentiated alignment strategies and targeted promotion plans should be formulated and implemented at the top-level design stage according to the actual development conditions of each corridor, so as to promote the coordinated and orderly development of the entire corridor network and maximize the comprehensive benefits of regional connectivity construction.

3.3 Harmonizing regulations and simplifying trade procedures

The improvement of physical infrastructure and the coordination of institutional rules constitute two core pillars for realizing unimpeded trade under the Belt and Road Initiative. Cross-border trade activities rely on well-established hardware facilities to guarantee the efficient flow of goods and production factors, while standardized

institutional systems serve as the fundamental guarantee for reducing transaction uncertainties and regulating market behaviors. Neither dimension can be neglected in the process of regional economic and trade cooperation. A large number of empirical studies based on the trade gravity model have quantified the interactive relationship between institutional factors and bilateral trade volume [23, p. 78]. The relevant estimation results demonstrate that a one-unit increase in institutional distance will cause bilateral trade to decline by approximately 15.2 %. In contrast, a one-standard-deviation improvement in trade facilitation level can boost bilateral trade by up to 17.1 %. The distinct numerical gap vividly reflects the profound influence of institutional environments on the operational performance of cross-border trade [8, p. 106].

The above empirical evidence further reveals the core constraint restricting the development of indigenous enterprises in participating economies. For a long time, stakeholders and market participants have tended to attribute enterprise development dilemmas to capital shortages and insufficient project reserves. Nevertheless, quantitative results prove that the most prominent bottleneck originates from the hidden transaction costs induced by the fragmentation of soft institutional arrangements. Within the Belt and Road regional cooperation network, participating countries differ substantially in legal systems, trade policies, regulatory criteria and law enforcement practices. The superposition of diversified institutional norms forms multi-layered invisible barriers to cross-border operations. If physical connectivity is advanced in isolation without synchronous regulatory alignment, the efficiency gains brought by infrastructure upgrading will be substantially offset by persistent institutional frictions. Accordingly, the parallel advancement of hardware connectivity and institutional coordination has become an inevitable choice to break trade constraints and expand market space for local enterprises.

In terms of regulatory coordination, participating countries feature differentiated legal traditions, historical backgrounds and development models, which means the full unification of regulatory rules across the region is impractical in the short run. Each sovereign state formulates institutional norms in accordance with its national conditions and industrial demands, and rigid rule unification will inevitably trigger new institutional

conflicts. Even so, the adverse impacts of institutional fragmentation can be effectively mitigated through in-depth bilateral and multilateral institutional docking and policy coordination [18, p. 101]. Effective regulatory coordination does not pursue absolute uniformity of rules, but focuses on building compatible and interconnected institutional systems on the premise of respecting national sovereignty and institutional differences, so as to foster a stable, transparent and predictable operational environment for cross-border trade and investment.

In the optimization of trade rules, all cooperative parties should jointly improve the supporting institutional framework. Priority shall be given to formulating high-standard clauses concerning investment protection and intellectual property rights protection, which are the basic components of fair trade order [33, p. 172]. Clear provisions on investor rights, asset security and profit repatriation can effectively stabilize market expectations. Meanwhile, sound intellectual property protection mechanisms can curb infringement behaviors, protect enterprises' independent research and development achievements, and create a favorable atmosphere for technological innovation and product iteration. In addition, a sound dispute settlement system is indispensable for resolving conflicts in cross-border cooperation. At the level of judicial risk management, it is urgent to establish a dedicated early warning database for investment dispute risks. This platform incorporates political risk, legal change risk and expropriation risk into a dynamic monitoring system, so as to realize real-time tracking, risk identification and pre-warning [45, p. 141]. Feng Yu argues that the construction of an efficient and impartial international investment dispute settlement mechanism is the key to safeguarding investor confidence and promoting the sustainable development of cross-border investment. A standardized dispute resolution mechanism can resolve frictions through institutional channels, maintain the normal order of regional trade and investment, and avoid the escalation of conflicts [14, p. 98].

In the process of institutional coordination, differentiated arrangements for small and medium-sized enterprises (SMEs) must be highlighted. As the main component of market entities in most Belt and Road countries, SMEs are generally constrained by small operational scales, limited capital strength and insufficient professional talent reserves.

Most local SMEs lack dedicated legal teams and professional international operation departments, making them far more vulnerable to complex cross-border institutional environments than large multinational enterprises [33, p. 173]. Therefore, institutional coordination must be embedded with SME-oriented supportive provisions. Specific measures include opening exclusive fast-track channels for dispute mediation and appropriately lowering the cost threshold of arbitration services, so as to reduce the rights-protection costs for small and medium-sized investors. In the field of standard mutual recognition, phased transition periods can be set according to the actual adaptive capacity of local enterprises, which can reserve sufficient adjustment time for SMEs and avoid operational shocks caused by abrupt rule changes.

From the perspective of trade institutional optimization and the exploration of bilateral trade potential, adopting targeted coordination strategies based on national institutional characteristics is an effective path to reduce trade frictions and fully release trade dividends. There is no universal standard for institutional docking; only targeted policies formulated in line with local realities can maximize coordination effects. Continuous regulatory coordination can also consolidate the cooperative foundation for win-win development of bilateral value chains between China and Belt and Road participating countries. The alignment of rules facilitates the docking of industrial chains and supply chains, and promotes the formation of an interdependent and mutually beneficial industrial ecosystem. Huang Huikang further points out that in the process of improving bilateral investment treaty protection systems, differentiated strategies should be implemented according to the maturity of host countries' legal systems [21, p. 28]. For countries with sound and mature legal frameworks, the focus of cooperation can be placed on rule mutual recognition and standard docking to further elevate trade and investment efficiency. For regions with relatively backward institutional construction, cooperation shall prioritize capacity building and institutional transplantation. Through technical assistance, personnel training and experience sharing, these countries can continuously improve their internal institutional systems and gradually realize integration with international prevailing rules.

Trade facilitation reform constitutes another core approach to cutting institutional

transaction costs and activating trade vitality. The optimization of trade procedures covers multiple interlinked links in cross-border operations [16, p. 20]. Combined with the practical characteristics of regional trade, the reform shall be carried out around four core directions: simplification of customs clearance procedures, harmonization of trade documents, promotion of standard mutual recognition, and enhancement of international customs cooperation. These four dimensions complement and interact with each other, jointly forming a complete trade facilitation system.

The Authorized Economic Operator (AEO) mutual recognition mechanism is a mature institutional tool in the field of trade facilitation [30, p. 16]. The research of Li Hailian and Li Caiyue has verified the significant economic effects of AEO mutual recognition on promoting regional trade cooperation. Enterprises with AEO qualification can enjoy preferential policies such as simplified inspection and priority clearance, which substantially cut customs clearance time and logistics costs. However, the existing AEO access threshold is generally high, and relevant preferential policies mainly benefit large-scale multinational enterprises and leading local manufacturers. A large number of creditworthy small and medium-sized export enterprises are excluded from this preferential system due to insufficient qualification conditions [7, p. 50]. In view of this practical problem, it is necessary to explore and build a Simplified AEO mechanism. On the premise of strictly controlling operational risks, the access criteria shall be appropriately lowered to provide low-cost facilitation options for eligible small and medium-sized export enterprises, so that more market entities can share the dividends of trade facilitation and realize inclusive development of cross-border trade.

The design and implementation of trade facilitation plans must fully take regional heterogeneity into account. The overall development level of local infrastructure directly restricts the implementation effect of various facilitation policies. Therefore, when formulating promotion plans, stakeholders shall refer to the comprehensive infrastructure development level of participating countries and combine regional practical conditions to launch differentiated implementation schemes. Countries along the Belt and Road differ greatly in customs management modes, administrative efficiency and supporting institutional environments. Such prominent regional disparities determine that a unified

promotion model cannot be applied to all regions. Mechanically copying the reform experience of advanced regions will not only fail to achieve expected goals, but also trigger new management problems and operational obstacles.

Risk prevention and control must be regarded as the bottom line throughout the trade facilitation reform. While simplifying procedures and lowering access thresholds, regulatory intensity shall not be relaxed. It is essential to establish a multi-dimensional risk assessment system covering political, legal and economic fields, and realize classified early warning and full-cycle dynamic management [43, p. 109]. Under the risk-controllable framework, pilot reform can be carried out in designated industrial parks. The pilot mechanism can isolate reform risks within a small scope, accumulate practical experience at low cost, and provide a reference for large-scale popularization.

In terms of the overall implementation path, this reform shall adopt a progressive expansion strategy from demonstration zones to the whole region. ASEAN countries and Central and Eastern European regions possess sound supporting facilities, mature customs management systems and a solid foundation for trade facilitation, making them the optimal choices for building reform demonstration zones [27, p. 105]. By carrying out various innovative practices in these regions, replicable and scalable reform models can be summarized. After the policies operate stably in demonstration areas, the mature experience can be gradually extended to Central Asia, South Asia and other regions with weak foundational conditions [36, p. 18]. This phased promotion model adapts to the gradient development characteristics of various regions along the routes, ensures the steady advancement of trade facilitation reform, and ultimately reduces the overall trade compliance costs for local enterprises and fully taps the potential of regional trade cooperation.

Conclusion

Amid profound restructuring of the global economic landscape and the evolving paradigms of international cooperation, the Belt and Road Initiative (BRI) has evolved from a forward-looking conceptual initiative into a mature, multi-dimensional practical cooperation mechanism that spans diverse regions, industrial sectors and functional domains. This thesis selects indigenous enterprises from BRI participating economies as the core research subject. Based on the macroscopic cooperation context, regional industrial landscapes, cross-border institutional environments and practical operational dilemmas, this paper systematically sorts out the overall development trajectory of local enterprises along the routes. By integrating qualitative theoretical deduction with quantitative empirical analysis via an augmented trade gravity model, this study identifies the core driving forces and restrictive factors influencing the operational performance and upgrading of local enterprises, and further puts forward targeted optimization strategies and implementation pathways.

From the perspective of market opportunities and development potential, the BRI has unlocked substantial growth momentum for market entities in participating countries. Driven by the construction of six major economic corridors and the continuous improvement of cross-border connectivity, the geographical barriers that once segmented regional markets have been gradually dismantled. The sustained expansion of bilateral trade scales and the steady growth of two-way investment flows have broadened market access, diversified capital sources and accelerated cross-border technology spillovers for local enterprises. For manufacturing firms, agricultural processing enterprises and service providers in developing economies, BRI cooperation facilitates their effective integration into regional and global industrial chains and value chains, delivering tangible growth in business scale and comprehensive competitiveness. In addition, distinct disparities in industrial foundations and economic development stages across participating countries have formed prominent gradient complementarities. Such structural characteristics not only shape differentiated development paths for local enterprises, but also create solid preconditions for in-depth cross-regional industrial collaboration and industrial upgrading.

While reaping the dividends of cross-border cooperation, enterprises along the routes are simultaneously constrained by prominent institutional frictions and operational bottlenecks. Regulatory fragmentation across jurisdictions stands out as a major invisible barrier to transnational business operations. Divergences in legal regimes, policy frameworks, trade norms and domestic business environments jointly drive up enterprises' costs of information acquisition, regulatory compliance and dispute resolution. Small and medium-sized enterprises (SMEs), in particular, suffer more severely from such institutional constraints due to their limited financial capacity and shortage of professional legal teams. Furthermore, the unbalanced distribution of infrastructure development remains a long-standing structural challenge. Despite the overall advancement of regional connectivity, many regions are still plagued by underdeveloped supporting facilities, inefficient branch line transportation and uneven construction progress. Deficient infrastructure and low logistics efficiency directly push up corporate operational costs. The superimposition of physical hardware bottlenecks and institutional barriers further suppress the development vitality of local enterprises.

The empirical results derived from the augmented gravity model corroborate the inherent correlation between explanatory variables and the export technological upgrading of local enterprises. The regression outcomes reveal that infrastructure quality is positively associated with the sophistication level of export products, verifying that sound physical infrastructure serves as the fundamental material foundation for industrial and structural upgrading of local firms. Differing from conventional academic viewpoints which assume institutional differences as pure obstacles to cross-border cooperation, this study empirically demonstrates that the institutional distance between China and host economies exerts a significantly positive effect on the improvement of local enterprises' export technology. This finding indicates that rational institutional disparities can stimulate technological complementarity and interactive learning between cooperative parties, and act as a vital impetus for indigenous enterprises to carry out technological innovation and product upgrading. Meanwhile, the intensity of BRI cooperation presents a positive influence on industrial development in participating countries, which fully validates the practical value and developmental effectiveness of this international cooperation

framework.

Targeting the dual predicaments of infrastructure inadequacy and regulatory fragmentation, this thesis proposes two major strategic orientations to advance the sustainable development of enterprises along the routes. First, continuous efforts should be made to scale up infrastructure investment and optimize regional connectivity layouts. It is imperative to break the single-channel financing model and establish a diversified investment and financing system featured by government guidance, market-oriented operation and multi-party international collaboration. Multilateral financial institutions and social capital should be fully mobilized to participate in cross-border infrastructure projects. In project implementation, the inclusive development philosophy should be upheld, with the participation of local enterprises, cross-border technology transfer and on-site talent training regarded as core components of cooperation. This approach can transform infrastructure construction from a simple solution to hardware shortages into a systematic mechanism for fostering endogenous development capabilities of local enterprises. In parallel, all participating parties shall promote the transformation of overland corridors from isolated linear transport routes to interconnected network systems, and remove the "last-mile" connectivity bottlenecks. In accordance with the heterogeneous infrastructure endowments of different economic corridors, differentiated construction strategies should be implemented to maximize the agglomeration and radiation effects of corridor economies .

Second, priority shall be given to promoting regulatory alignment and streamlining trade procedures. Given the objective existence of institutional heterogeneity among participating countries, the full unification of rules and norms in the short run is practically unachievable. Relevant stakeholders need to deepen bilateral and multilateral institutional coordination, and improve supporting mechanisms covering investment protection, intellectual property rights protection and dispute settlement. Targeted institutional arrangements shall be formulated to mitigate cross-border operational risks for SMEs. In the field of trade facilitation, authorities need to comprehensively optimize customs clearance procedures and promote the mutual recognition of trade documents and technical standards. Customized facilitation mechanisms should be developed to

accommodate the operational characteristics of small and medium-sized export enterprises. Considering regional disparities in customs administration and infrastructure conditions, differentiated promotion plans and pilot reform programs are recommended. Replicable experience shall be gradually scaled up to effectively reduce institutional transaction costs for market players.

Overall, the high-quality development of BRI cooperation and the growth of indigenous enterprises in participating countries are mutually reinforcing and interdependent. The advancement of physical connectivity and institutional alignment must be coordinated in a synergistic manner, so as to build a sound industrial ecosystem characterized by low operational costs, unimpeded factor circulation and standardized rules. Looking forward, follow-up BRI cooperation shall shift from the pursuit of quantitative expansion of projects and trade volume to the improvement of cooperation quality. Equal emphasis should be placed on infrastructure construction, regulatory docking, talent cultivation and industrial coordination. By continuously eliminating various restrictive factors and fully unlocking the development potential of local enterprises, the BRI economic and trade cooperation can advance toward a more stable, inclusive and sustainable trajectory.

This study inevitably has several limitations. Due to constraints on data availability, some small-scale economies and regions with incomplete statistical data are excluded from the research sample. The core empirical indicators are adopted from publicly available databases with fixed statistical frequencies, leaving room for further optimization of data processing methods. In addition, this research mainly conducts analysis at the macro and meso levels, lacking in-depth micro-level case studies and long-term tracking of individual enterprises. On the basis of the current research, future studies can conduct field investigations and case analyses targeting typical enterprises and key economic corridors, so as to further explore the micro transmission mechanisms of factors affecting enterprise development. Further research can also delve into the developmental impacts of emerging areas such as digital infrastructure and industry-education integration under the BRI framework, so as to and provide more elaborate theoretical support and practical references for the sustainable advancement of regional cooperation.

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