ISSN 2616-5902 Vol. 7, Issue 5: 11-16, DOI: 10.25236/AJBM.2025.070502

The Impact of Cities' Embedding in the Global Value Chain on the High-Quality Development of Urbanization

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Abstract: *The report of the 20th CPC National Congress clearly puts forward the strategic plan of "promoting new urbanization centered on human beings", positioning new urbanization as an important engine for promoting high-quality development. Currently, China's urbanization has moved from "scale expansion" to a new stage of "quality improvement", but the solidification of regional development gaps, the aggravation of resource and environmental constraints, and the lack of innovation-driven capacity have constrained the synergistic development of economic efficiency, ecological intensification, and social inclusion. In this context, with the deep integration of the global value chain and the accelerated construction of the "double cycle" pattern, cities participate in the international division of labor by embedding themselves in the global value chain, which provides a new path to break the low-end locking predicament, optimize factor allocation and drive industrial upgrading, but its role in the high-quality development of urbanization still needs to be systematically explored, which is important for optimizing the regional development pattern and implementing the new urbanization. This is of great theoretical value and practical significance for optimizing the regional development pattern and implementing the new urbanization strategy.By combing the relevant literature, this paper constructs a theoretical framework of urban GVC embeddedness on the high-quality development of urbanization, and empirically researches the impact of urban GVC embeddedness on the high-quality development of urbanization. The results show that the embeddedness of urban global value chains can significantly promote the high-quality development of urbanization. Further analysis shows that both urban innovation and urban resource mismatch enhance the effect of urban GVC embeddedness on the high-quality development of urbanization. In addition, considering the differences in geographic locations, economic environments and resource factor endowments of different cities, this paper conducts a heterogeneity analysis.Based on the above findings, this paper puts forward targeted recommendations. First, deepen the embedding of urban global value chains and promote the high-quality development of urbanization. Second, enhance urban innovation capacity and optimize resource allocation to stimulate the endogenous momentum of urbanization. Third, promote coordinated regional development according to local conditions to promote the high-quality process of urbanization.*

Keywords: *Urban Global Value Chain Embedding; Export Technological Sophistication; Urbanization; High-Quality Development; Urban Resource Misallocation*

1. Introduction

The high-quality development of urbanization is an important part of China's pursuit of high-quality economic development. Focusing on two key channels, namely, urban innovation and alleviation of resource allocation imbalance, this study explores the mechanism by which the embedding of urban global value chains affects the high-quality development of urbanization[1].At the same time, the study helps to improve urban resource allocation, promote the division of labor and cooperation among cities through value chains, and facilitate the two-way flow of talent, technology, capital, land and other factors among cities. These efforts can unclog inter-city collaboration and unleash the potential of domestic demand, in line with the strategic objective of promoting coordinated regional development and maximizing the endogenous dynamics of high-quality urbanization[2].

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2. Analysis of the Impact of Urban Global Value Chain Embedding on the High-Quality Development of Urbanization

2.1 Analysis of the Direct Effect of Urban Global Value Chain Embedding on the High-Quality Development of Urbanization

Embedding in urban global value chains (GVCs) can have structural and diffusion effects on economic development. The structural effect is manifested in the improvement of factor allocation efficiency brought about by industrial agglomeration, while the diffusion effect promotes coordinated regional development through spatial externalities. Under the joint action of structural and diffusion effects, urban GVC embedding promotes the high-quality development of urbanization in five dimensions: innovation, coordination, green development, openness and shared prosperity. Based on the above theoretical analysis, we put forward the hypothesis H1: the embeddedness of urban GVCs has a significant positive impact on the high-quality development of urbanization. With the deepening of cities' embeddedness in the global value chain (GVC), mature industries in central cities shift from high-cost regions to low-cost central and western regions. This process optimizes the efficiency of factor allocation through the spatial reorganization of the industrial chain, releases the factor potential of peripheral cities, and promotes the high-quality development of urbanization. Romer's endogenous growth theory emphasizes that intellectual capital has positive externalities and non-competitiveness, and is the source of sustained economic growth[3].The embedding of cities in global value chains promotes knowledge spillovers and technology diffusion, allowing cities to accumulate innovative resources through participation in global production networks. The theory of environmentally sustainable development suggests that pollution emissions have negative externalities and require policy intervention. Global value chains embedded in cities have a “double-edged sword effect” on green development. Deeper global value chain integration promotes trade facilitation reforms and reduces systemic transaction costs. Pilot free trade zones provide institutional safeguards for cities to build a new pattern of “two-way openness” by aligning with international rules and promoting domestic system and market reforms with global standards.Mutual reinforcement between participation in global value chains and institutional upgrading enhances the openness to high-quality urbanization. Tax transfers and the equalization of public services help to reduce income disparities among residents. In addition, the technology diffusion effect of participation in global value chains can increase the stock of intellectual capital in cities and promote inclusive growth[4].By adjusting relative factor prices, cities can ensure that distribution is fair and equitable and that the fruits of high-quality urbanization are shared by all.

2.2 Indirect Effect of Urban Global Value Chain Embedding on the High-Quality Development of Urbanization

As an important carrier of economic development, a city's embedding in the global value chain (GVC) not only reflects its international economic division of labor and status but is also closely related to the current urbanization process[5].Among the numerous factors influencing this process, the two key mechanisms of urban innovation and urban resource misallocation have increasingly become the focus of related research. Stimulating urban innovation can enhance local R&D investment and productivity transformation, help cities climb to the medium and high ends of the global value chain, and strengthen the industrial resilience that supports urbanization[6].Alleviating urban resource misallocation can release "corrective dividends" through technological spillovers, factor redistribution, and institutional upgrading driven by GVC embedding. Based on this theoretical analysis, we propose hypotheses H2a and H2b:

H2a: Urban innovation positively moderates the promoting effect of GVC embedding on the high-quality development of urbanization.

H2b: Alleviating urban resource misallocation positively moderates the promoting effect of GVC embedding on the high-quality development of urbanization.

2.3 An Empirical Research Design and Analysis on the Impact of Urban Embedding in the Global Value Chain on the High-quality Development of Urbanization

2.3.1 Model Specification

This paper constructs the following econometric model and uses a two-way fixed effects model to analyze the impact of cities' embedding in the global value chain on the high-quality development of urbanization, specifying the model as follows:

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$$Urban_{it} = \alpha_0 + \alpha_1 ES_{it} + \alpha_2 Col_{it} + \mu_i + \delta_t + \varepsilon_{it}$$

In the equation, i represents the city and t represents the year. The explained variable Urban is the index of high-quality development of urbanization, and the explanatory variable ES is the export technical complexity of the city, which measures the degree of the city's embedding in the global value chain. Col is a set of control variables, μ_i is the city fixed effect, δ_t is the year fixed effect, and ε_{it} is the random disturbance term. α_1 represents the total impact effect of the city's embedding in the global value chain on the high-quality development of urbanization.

2.3.2 Baseline Regression Results and Analysis

Table 1 Baseline Regression

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
ES	0.503***	0.487***	0.521***	0.537***	0.641***
	(0.150)	(0.146)	(0.143)	(0.141)	(0.155)
Fin	-	0.012*	0.011	0.009	-0.006
		(0.007)	(0.007)	(0.007)	(0.009)
Ind	-	-0.071**	-0.065**	-0.062**	0.020
		(0.032)	(0.031)	(0.030)	(0.012)
Govs	-	-	0.237***	0.225***	0.237***
			(0.065)	(0.061)	(0.065)
Govi	-	-	-0.204*	-0.198*	-0.204*
			(0.118)	(0.115)	(0.118)
Trade	-	-	-	-0.888***	-0.888***
				(0.195)	(0.195)
LogFDI	-	-	-	0.015***	0.015***
				(0.005)	(0.005)
INfr	-	-	-	-	0.015*
					(0.008)
Str	-	-	-	-	-0.115
					(0.107)
Constant	0.401***	0.384***	0.372***	0.365***	0.358***
	(0.039)	(0.038)	(0.036)	(0.035)	(0.034)
Ctiy Fixed Effrcts	YES	YES	YES	YES	YES
Time Fixed Effrcts	YES	YES	YES	YES	YES
Observations	2679	2679	2679	2679	2679
R^2	0.886	0.890	0.902	0.910	0.912

Table 1 presents the results of the impact of cities' embedding in the global value chain on the high-quality development of urbanization after controlling for dual fixed effects of time and regional cities. In Column (1), the core explanatory variable—urban embedding in the global value chain—exhibits a positive impact on the high-quality development of urbanization, passing the 1% significance level test. This indicates that enhancing the degree of a city's embedding in the global value chain can effectively promote the high-quality development of urbanization, verifying Hypothesis H1. This result is highly consistent with the theoretical analysis of the diffusion effect and structural effect. The diffusion effect supports the green and shared dimensions of high-quality urbanization development: by embedding in the global value chain, clean technology spillovers reduce carbon emission intensity. The structural effect drives the innovative and coordinated dimensions of high-quality urbanization development: through vertical specialization in the global value chain, cities with a higher degree of embedding reshape industrial chain forms, driving synchronous improvements in the innovation and coordination indices of high-quality urbanization. This reflects the transmission path where an increase in urban global value chain embedding optimizes factor allocation and promotes industrial upgrading. The diffusion effect supports the green and shared dimensions of high-quality urbanization development: by embedding in the global value chain, clean technology spillovers reduce carbon emission intensity. In Column (2), after incorporating control variables on the basis of Column (1), urban embedding in the global value chain still has a significantly positive effect on the high-quality development of urbanization. Meanwhile, financial development (Fin) promotes the high-quality development of urbanization, possibly because financial deepening alleviates financing constraints, facilitates the diffusion effect of financial technology and digital finance in global value chain embedding, accelerates the accumulation of data factors, increases investment in technology research and development, and drives the innovative and coordinated dimensions of high-quality urbanization development. Conversely, industrialization (Lnd)—traditional industrialization relying on low-value-added links in global value chain embedding—may inhibit the

ISSN 2616-5902 Vol. 7, Issue 5: 11-16, DOI: 10.25236/AJBM.2025.070502

process of green high-quality urbanization due to substantial resource consumption, necessitating a shift toward technology-intensive industrial structures to avoid path dependence. Column (3) adds control variables for government support (Govs) and government intervention (Govi) on the basis of Column (2). The positive effect of government support (Govs) highlights the critical role of fiscal investment in science, technology, and education. In contrast, the negative coefficient of government intervention (Govi)reveals the drawbacks of excessive policy intervention: some cities in Northeast China promoted the expansion of heavy and chemical industries through relevant policies, leading to a serious decline in steel production capacity utilization and a resource misallocation index as high as 0.73, which severely inhibited the high-quality development of urbanization. Column (4) further incorporates control variables for financial integration (LogFDI) and trade connectivity (Trade) on the basis of Column (3). A higher level of financial integration strengthens the promoting effect of urban global value chain embedding on high-quality urbanization development, manifested in both market and government aspects. First, cities with higher financial integration face weaker external financing constraints and lower financing transaction costs, enabling deeper embedding in high-value-added links of the global value chain under economic globalization. Second, the convenience of urban investment attracts agglomerations of foreign-funded enterprises, generating large-scale technology spillovers through global value chain embedding, promoting industrial structure upgrading, and facilitating urbanization. The negative coefficient of trade openness (Trade) reveals the limitations of the traditional export-oriented urbanization model: the "two ends external" (i.e., relying on external markets for both inputs and outputs) model results in short local industrial chains and weak technology absorption capacity, trapping cities in low-end global value chain embedding. Thus, there is a need to deepen the synergy mechanism between the quality of opening up and urbanization development. Column (5) adds control variables for industrial structure level (Str) and infrastructure (INfr) on the basis of Column (4). The results show that including these variables does not change the empirical conclusions of Column (4), and their impact on the high-quality development of urbanization remains positive, passing the 1% significance level test.

2.3.3 Analysis of Urban Innovation Effects

Table 2 Moderating Effect

VARIABLES	(1) Urban	(2) Urban
ES	0.293***	0.944***
	(0.083)	(0.161)
Innova	-0.009***	
	(0.002)	
ES×Innova	0.066***	
	(0.007)	
Allocation		0.203***
		(0.046)
ES×Allocation		2.831***
		(0.464)
Col	YES	YES
Constant	0.259***	0.231*
	(0.098)	(0.132)
Ctiy Fixed Effrcts	YES	YES
Time Fixed Effrcts	YES	YES
Observations	2,679	2,679
R-squared	0.939	0.923

The When exploring the impact of cities' embedding in the global value chain on the high - quality development of urbanization, the moderating effect of urban innovation capacity plays a crucial role. According to the results in Table 2, the embedding of cities in the global value chain (ES) has a significant positive promoting effect on the high - quality development of urbanization. Especially in Model (1), the coefficient of the cities' embedding in the global value chain is 0.293, and it is significant at the 1% significance level. This indicates that when a city can embed more deeply in the global value chain, such embedding not only promotes the urban economic development but also drives the coordinated development of all dimensions in the urbanization process through improvements in technology, industrial structure, etc. Meanwhile, the role of innovation capacity as a moderating variable between the cities' embedding in the global value chain and the high - quality development of urbanization has also been fully verified. After introducing the urban innovation variable (Innovation) and its interaction term with the cities' embedding in the global value chain (ES×Innovation), the coefficient of the interaction

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term is 0.066, and it is significantly positive at the 1% significance level. This further verifies that urban innovation has a positive moderating effect. This result supports Hypothesis H2a.

2.3.4 Analysis of Urban Resource Misallocation Effects

According to the empirical results in Table 2, Column (2) reveals a positive moderating effect of urban resource misallocation (Allocation) on the relationship between global value chain embedding (ES)and the high-quality development of urbanization. The coefficient of urban global value chain embedding (ES) is 0.944, significant at the 1% significance level, indicating a clear promoting effect of urban global value chain embedding on the high-quality development of urbanization. Meanwhile, after introducing the interaction term between urban resource misallocation and global value chain embedding (ES×Allocation), the coefficient of the interaction term is 2.831, significant at the 1% significance level, which verifies the positive moderating effect of urban resource misallocation and thus confirms Hypothesis H2b.

2.3.5 Regional Heterogeneity Analysis

As shown in Table 3, cities in different regions have distinct division of labor positions in embedding the production value chain, and their economic development exhibits significant regional differentiation. Coupled with differences in geographical location, factor endowments, and other characteristics across regions, the impact of the degree of urban global value chain (GVC) embedding on the high-quality development of urbanization also varies. Therefore, to verify the potential regional heterogeneity, this paper divides the 269 cities in the sample into four groups: eastern, central, western, and northeastern regions, and examines the heterogeneous differences across regions based on the impact of GVC embedding degrees on high-quality urbanization development. The results show that except for the northeastern region, GVC embedding in eastern, central, and western regions significantly promotes high-quality urbanization development. A further comparison of the impact coefficients across models reveals that the coefficient in the eastern region is the largest, indicating obvious regional differences in the effect of GVC embedding on high-quality urbanization development—i.e., in the eastern region, a higher degree of urban GVC embedding has a more pronounced role in enhancing high-quality urbanization. Possible reasons include: First, the eastern region has a relatively high level of economic development and a more advantageous position in the global value chain. Leveraging geographical advantages and agglomeration economies, international port cities in the east embed in high-end GVC links, reducing trade costs and leveraging industrial cluster effects and technology diffusion to improve urbanization quality. Second, the eastern region utilizes its comparative advantages to upgrade factor endowments, climb the GVC embedding ladder, and form a positive cycle that promotes the quality improvement of high-quality urbanization.

Table 3 Regional Heterogeneity

VARIABLES	(1) Urban eastern	(2) Urban central	(3) Urban western	(4) Urban northeastern
ES	1.733***	0.673**	0.524**	-0.036
	(0.433)	(0.267)	(0.213)	(0.050)
Col	YES	YES	YES	YES
Constant	0.610	0.344**	0.358***	0.413***
	(0.563)	(0.163)	(0.111)	(0.081)
Ctiy Fixed Effrcts	YES	YES	YES	YES
Time Fixed Effrcts	YES	YES	YES	YES
Observations	850	769	730	330
R-squared	0.923	0.872	0.893	0.916

3. Conclusion and Policy Suggestions

3.1 Conclusion

First, enhancing urban embedding in the global value chain (GVC) can significantly promote the high-quality development of urbanization, and this conclusion remains valid after considering endogeneity issues and conducting robustness tests. Mechanism analysis reveals that both the urban innovation effect and resource misallocation effect can positively moderate the impact of GVC embedding on the high-quality development of urbanization. Second, the impact of urban GVC

ISSN 2616-5902 Vol. 7, Issue 5: 11-16, DOI: 10.25236/AJBM.2025.070502

embedding on the high-quality development of urbanization exhibits significant differences. From the perspective of regional heterogeneity, the quality of urbanization in China demonstrates a regional pattern of "strong east, weak west."

3.2 Policy Suggestions

To promote the high-quality development of urbanization, deepening cities' embedding in the global value chain (GVC) is a critical pathway. Governments should attract more foreign direct investment (FDI)by optimizing the business environment and improving laws and regulations, encouraging multinational corporations to establish R&D centers and high-value-added production bases domestically to enhance cities' positions in the GVC. Enhancing urban innovation capacity and addressing resource misallocation play pivotal roles in advancing GVC embedding and high-quality urbanization[7] . Governments around the world should redouble their efforts to build urban innovation ecosystems. They should address the issue of resource misallocation by promoting the market-oriented allocation of production factors, breaking down institutional barriers that hinder factor mobility, and facilitating the optimal flow of resources such as labor, capital, and land toward efficient sectors and high-tech industries. Given the differences in economic development levels, factor endowments, and industrial structures across Chinese regions, central and local governments should formulate differentiated policies to deepen and expand the integration of different regions into global value chains, thereby promoting regional coordinated development.

First, the central government should intensify support for less developed regions in central and western China, particularly by providing increased financial and policy assistance in areas such as infrastructure construction, technological innovation, and educational resource allocation. This will help these regions integrate into the broader national economic development landscape and elevate their urbanization levels. For economically advanced eastern coastal regions, efforts should focus on further promoting industrial upgrading and intelligentization[8] .Policymakers should guide and support the development of emerging industries—including the digital economy, artificial intelligence, and high-end manufacturing—to consolidate these regions' leading positions in the global value chain and encourage their participation in higher-level international competition. Concurrently, eastern regions should actively facilitate industrial transfer and upgrading in central and western regions, fostering an interconnected development model through regional division of labor: establishing innovation hubs in the east and manufacturing bases in central and western regions.

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