Compilation of China’s Logistics Industry Input-Output Tables and Estimation of Its Contributions to Economic and Employment Growth

Abstract: Based on the Classification Standards of the Social Logistics Statistical Survey System released by the National Development and Reform Commission, this paper constructs a non-competitive input-output model that reflects the logistics industry and compiles logistics industry input-output tables for China in 2012, 2017, 2020, and 2023. On this basis, we estimate the contribution of the logistics industry to China’s economic and employment growth through inter-industry linkages. In addition, using a provincial multi-regional input-output table, we develop a demand value-led analytical framework to characterize the extension paths of regional logistics industry chains and to assess their employment effects on other regions within the context of a unified national market.

The analysis relies on two main types of data: national input–output tables and sector-level employment statistics. The benchmark input–output data are derived from non-competitive tables that explicitly account for processing trade, compiled by the Global Value Chain Research Group of the Institute of Mathematics and Systems Science, Chinese Academy of Sciences. These data are consolidated into non-competitive input–output tables with 139 sectors for 2012, 149 sectors for 2017, 153 sectors for 2020, and 211 sectors for 2023. To conduct spatial analysis, the study also employs multi-regional input–output tables for 2012, 2017 and 2020 obtained from the China Emission Accounts and Datasets (CEADs) database.

This study makes three main contributions. First, it innovatively constructs a logistics-specific input–output framework and compiles 20-sector input–output tables that not only retain detailed sectoral classifications but also split selected sectors into logistics-related and traditional components. This structure enables a more precise depiction of the interconnections between the logistics industry and traditional sectors, providing a methodological and data foundation for analyzing the role of logistics in economic circulation. Second, within the input–output framework, the impacts of the logistics industry on economic output and employment are quantified and decomposed into three transmission channels: the pure logistics industry chain effect, the effect of logistics-driven expansion of traditional sectors along related industry chains, and the reverse effect of traditional sectors stimulating logistics demand. Third, in the context of building a unified national market, a demand value–oriented analytical framework based on multi-regional input–output tables is developed to systematically trace the spatial extension of regional logistics industry chains and to estimate the cross-regional employment spillover effects of the logistics industry.

The results show that, first, the contribution of the logistics industry to aggregate GDP first increased and then declined, whereas its contribution to employment rose steadily and reached 6.23% in 2023. Second, the logistics industry contributes to GDP and employment mainly by stimulating the development of downstream industries in the supply chain. Third, the value added and employment created by the logistics industry itself are smaller than the value added and employment it induces in traditional industries. Fourth, the development of the logistics industry in transportation-node provinces and border provinces significantly increases employment effects in other regions. This study provides an important method for scientifically and accurately quantifying the economic effects of the logistics industry and offers policy implications for promoting the development of transportation-node cities and accelerating the establishment of a unified national market.

Keywords: logistics industry; input-output model; employment effect; industrial linkages

1. Introduction

As a fundamental, strategic, and leading sector of the national economy, the logistics industry is playing an increasingly important role in smoothing the economic circulation, optimizing resource allocation, and supporting the high-quality development of the real economy. The Report to the 20th National Congress of the Communist Party of China emphasized the need to "build an efficient and unimpeded circulation system" and to "reduce logistics costs," pushing the modernization of the logistics industry to a new stage.

A well-developed logistics network provides crucial physical support for building a "unified national market." It not only significantly reduces interregional trade costs and promotes the free flow and efficient agglomeration of production factors, but also effectively unleashes the potential of economies of scale and scope (He et al., 2024). At the same time, logistics infrastructure serves as both an "adhesive" and a "stabilizer" for industrial and supply chains, ensuring close, secure, and reliable connections among production, supply, and sales links, and becoming an important cornerstone for industrial upgrading and enhanced industrial resilience. Since 2010, driven by the rapid growth of e-commerce, China's express delivery industry has achieved a dramatic scale expansion, with business volume ranking first in the world. According to data from the China Federation of Logistics and Purchasing, the total value of social logistics in China increased from RMB 197.7 trillion in 2013 to RMB 347.6 trillion in 2023, maintaining a relatively high average annual growth rate.

Existing studies have explored the economic effects of logistics industry development. A large body of research examines how the sound development of the logistics industry affects economic growth, labor employment, market integration, firm productivity, and capital flows (Liu and Hu, 2023; He et al., 2024; Li and Lu, 2024; He et al., 2025). Some studies also investigate the economic effects of logistics node construction. Yuan et al. (2023) find that logistics infrastructure affects rural household income. Zou and Lu (2025) show that logistics development helps raise farmers' income and accelerates the cross-regional circulation of agricultural products. As the logistics industry is an important component of the domestic economic cycle, its integrated development with other industries has also become a research focus. Chen et al. (2023) examine the theoretical mechanisms through which the coordinated agglomeration of logistics and manufacturing enhances regional economic resilience and provide empirical evidence on this relationship. Wang and Li (2023) measure the co-agglomeration level of the logistics and manufacturing industries and find significant two-way co-agglomeration in China, with a stronger tendency for manufacturing to agglomerate toward logistics. Regarding the overall measurement of logistics industry development, Chen et al. (2019) identify the path toward coordinated development of the logistics industry using a convergence model. Liu et al. (2021) construct a global super-efficiency EBM model that incorporates undesirable outputs to empirically measure provincial logistics efficiency in China. Zhang et al. (2023) evaluate the level of high-quality development of China's logistics industry, regional gaps, and spatiotemporal differentiation using an index evaluation method. Overall, the existing literature mainly focuses on the effects of logistics development at the micro level and on the development trend of the logistics industry itself. It has not sufficiently analyzed, from a macro perspective, the cross-industry and cross-regional coordination mechanisms or the important position and function of the logistics industry as an intermediate structure in the economic circulation. How to scientifically and systematically quantify the comprehensive contribution of the logistics industry, especially its indirect effects transmitted through industrial chains across different regions, remains an important practical issue. In this context, the input-output model, which can effectively reveal technological and economic linkages among industries, has been widely used in analyses of industrial linkage effects. This paper employs this method to estimate the impact of the logistics industry on China's economy and employment through industrial linkages.

For a long time, because logistics activities permeate all areas of the national economy, they have been dispersed across traditional industrial classifications and lack an independent and systematic accounting framework, making it difficult to estimate their economic contribution. The Social Logistics Statistical Survey System jointly formulated by the National Development and Reform Commission and the China Federation of Logistics and Purchasing provides an important basis for defining the scope of modern logistics activities. Based on this classification standard, this paper aggregates and integrates logistics activities scattered across transportation, warehousing, postal services, wholesale, retail, and other sectors; constructs a non-competitive input-output model that captures the characteristics of the logistics industry; and compiles China's logistics industry input-output tables for 2012, 2017, and 2023. Using this model, we not only estimate the direct contribution of the logistics industry to gross domestic product (GDP) and employment, but also further analyze its indirect effects on economic growth and employment through forward and backward linkages, thereby revealing the structural position of the logistics industry in the macroeconomy and its evolving trend.

This paper makes three main contributions. First, it innovatively constructs an input-output model for the logistics industry and, based on the Social Logistics Statistical Survey System formulated by the National Development and Reform Commission and the China Federation of Logistics and Purchasing, compiles 20-sector input-output tables for China for 2012, 2017, and 2023. These tables include detailed broad sectors while splitting some sectors into logistics-related and traditional-industry components, which makes it possible to characterize the linkages between the logistics industry and traditional industries and provides a methodological and data foundation for studying the role of the logistics industry in the economic circulation. Second, within the input-output framework, it estimates the impact of the logistics industry on China's economy and employment through industrial linkages and decomposes the transmission channels into the pure logistics industry chain path, the path in which the logistics industry stimulates traditional industries, and the path in which traditional industries stimulate the logistics industry. Third, against the background of building a unified national market, it uses a multi-regional input-output table to construct a demand value-led analytical framework, systematically characterizes the extension paths of regional logistics industry chains within the unified national market, and calculates the interregional employment effects of the logistics industry.

2. Model Specification and Accounting Methods

2.1 An Input-Output Model Reflecting the Logistics Industry

This paper constructs a logistics industry input-output model on the basis of the traditional non-competitive input-output model. The model can clearly reflect the input-output linkages between traditional industries and the logistics industry, such as the direct consumption of logistics services by traditional industries and the direct consumption of traditional industry outputs by the logistics industry.

Suppose an economy contains n industries, of which the first n−1 are traditional industries and the last one is the logistics industry. For simplicity, superscripts t and d denote traditional industries and the logistics industry, respectively. All variables in the logistics industry input-output table corresponding to the model are measured in value terms. Let $Z^{tt} = \left(z_{ij}^{tt}\right)_{(n-1)\times(n-1)}$ denote the matrix of intermediate inputs from traditional industries to traditional industries, where the element z_{ij}^{tt} represents the amount of traditional industry i directly consumed by traditional industry j in the production process. Let $Z^{dd} = (z_{nn}^{dd})_{1\times1}$ denote the intermediate input of the logistics industry into itself, i.e., the amount of logistics services directly consumed by the logistics industry in its own production process. Let $Z^{td} = \left(z_{ij}^{td}\right)_{(n-1)\times1}$ denote the intermediate inputs from traditional industries to the logistics industry, where the element z_{ij}^{td} represents the amount of traditional industry i directly consumed by the logistics industry. Let $Z^{dt} = \left(z_{ij}^{dt}\right)_{1\times(n-1)}$ denote the intermediate inputs from the logistics industry to traditional industries, where the element z_{ij}^{dt} represents the amount of logistics services directly consumed by traditional industry j. Let $Y = C + I + EX$ denote the final demand of each sector, where C, I, and EX represent the column vectors of consumption, capital formation, and exports in final demand, respectively. Let V denote the value added of each sector, equal to the sum of labor compensation, net production taxes, operating surplus, and depreciation of fixed assets; Q denote the labor required by each sector; and X denote the total output of each sector.

According to the row-balance condition of the input-output table, we have $X = Z\mu + Y$, where $Z = \begin{bmatrix} Z^{tt} & Z^{dt} \\ Z^{td} & Z^{dd} \end{bmatrix}$ and μ is an n-dimensional column vector of ones. Let $A = \begin{bmatrix} A^{tt} & A^{dt} \\ A^{td} & A^{dd} \end{bmatrix} = Z\hat{X}^{-1}$ be the matrix of direct input coefficients, where the diagonal elements of the corresponding matrix are given by X. The input-output model can then be written as:

$$X=AX+Y=(I\text{-}A)^{-1}Y=LY \tag{1}$$

Here, I is an identity matrix with the same dimension as A, and the Leontief inverse matrix, also called the matrix of total input coefficients, contains both the direct and indirect input relationships among sectors and can comprehensively reflect the complex economic linkages among all sectors of the national economy (Leontief, 1936).

Let the row vectors of value-added coefficients and employment coefficients be denoted by $v = V'\hat{X}^{-1}$ and $q = Q'\hat{X}^{-1}$, respectively. According to the input-output model, the value added and employment of each sector induced by final demand can be expressed as follows:

$$V = \begin{bmatrix} \hat{v}^t & 0 \\ 0 & \hat{v}^d \end{bmatrix} [I - A]^{-1} \begin{bmatrix} Y^t \\ Y^d \end{bmatrix} = \hat{v}LY \tag{2}$$

$$Q = \begin{bmatrix} \hat{q}^t & 0 \\ 0 & \hat{q}^d \end{bmatrix} [I - A]^{-1} \begin{bmatrix} Y^t \\ Y^d \end{bmatrix} = \hat{q}LY \tag{3}$$

2.2 Measuring the Contribution of the Logistics Industry to Economic and Employment Growth

At present, many studies directly use the value added of a given industry to represent its contribution to the economy. In reality, however, the production of a single industry can indirectly stimulate the production of other industries through industrial linkages. Likewise, the production of other industries can indirectly stimulate the production of that industry. Therefore, ignoring the linkage relationship between the logistics industry and traditional industries may lead to an underestimation of the impact of the logistics industry on the national economy. The logistics industry input-output model constructed in this paper describes in detail the input-output linkages between the logistics industry and traditional industries and thus helps provide a more comprehensive estimate of the impact of the logistics industry on value added and employment in China. Within the input-output framework, the impact of the logistics industry on value added or employment is equivalent to the value added or employment generated by the logistics industry itself plus the value added or employment induced in traditional industries. If Equations (2) and (3) are directly used to calculate the impact of the logistics industry on value added or employment, the result will also include the impact generated by purely traditional-industry production and hence overestimate the effect of the logistics industry. Therefore, following Zhang et al. (2025), this paper uses the Hypothetical Extraction Method (HEM) to measure the impact of the logistics industry on value added and employment. The basic idea of this method is to “extract” the part under study, and the difference before and after extraction is interpreted as the impact generated by that part (Los et al., 2016). This method has been widely used to evaluate the effects of trade policies and major unexpected shocks. For example, Yan and Tian (2020) use it to estimate the effects of changes in the global industrial layout on China’s value added and employment; Tsirimokos(2023) use it to examines the interindustry greenhouse gas (GHG) emissions linkages within the Greek economy for the year 2018; and He et al. (2024) and Zhu et al. (2025) use this approach to estimate sectoral carbon emission linkages in China’s transportation sector (2002–2020) and to track the dynamic changes in value added in the Chinese bioeconomy (1995–2018), respectively. Based on this method, the formulas for measuring the contribution of the logistics industry to value added and employment can be expressed as follows:

$$V^{D-D} = \hat{v}^{d0} L^{dd0} Y^{d0}, Q^{D-D} = \hat{q}^{d0} L^{dd0} Y^{d0} \tag{4}$$

$$V^{T-D} = \sum\nolimits_{j=1}^{n-1} \left(V_j^{DI} - V_j^{D-D}\right), Q^{T-D} = \sum\nolimits_{j=1}^{n-1} \left(Q_j^{DI} - Q_j^{D-D}\right) \tag{5}$$

$$V^{D-T} = (V_n^{DI} - V_n^{D-D}), Q^{D-T} = (Q_n^{DI} - Q_n^{D-D}) \tag{6}$$

Here, $\hat{v}^{d0}$and $\hat{q}^{d0}$ denote the value-added coefficients and employment coefficients of the relevant sectors. V^{T-D} and Q^{T-D} denote the value added and employment created by the logistics industry through its own industrial chain path. In Equations (5) and Equations (6), $V^{DI} - V^{D-D}$ and $Q^{DI} - Q^{D-D}$ are n-dimensional column vectors representing the value added and employment created by the logistics industry through industrial chains linked with traditional industries. Within the associated industrial chain, the value added and employment generated in the $n-1$ traditional industries, $V^{T-D}$and Q^{T-D}, are driven by the demand pull from the logistics sector. In contrast, the value added and employment created in the logistics sector, $V^{D-T}$and Q^{D-T}, arise from the demand pull exerted by traditional industries on the logistics sector.

2.3 Multi-Regional Input-Output Model

Based on China’s provincial input-output tables for 2012 and 2017 and following the approach of Wang et al. (2022), this paper constructs an employment-extended multi-regional input-output (EE-MRIO) model to investigate how income-driven supply-chain expansion creates employment across regions.

The basic principle of the multi-regional input-output model is as follows. Suppose the economic system of each of m regions includes n sectors. Then the intersectoral product transaction matrix T contains m × m submatrices of dimension n × n. The elements of each submatrix represent the direct consumption of the output of sector i in region r by sector j in region s (i, j = 1, 2, …, n; r, s = 1, 2, …, m). The final demand matrix Y and total output matrix X each include m submatrices of dimensions n × 5 and n × 1, respectively. Let the direct input coefficient of sector j in region s for sector i in region r be denoted accordingly, with the corresponding term being an element of matrix X. Let all direct input coefficients be summarized by matrix A.

In this study, employment in each sector of each region is incorporated as a satellite account of the input–output table to construct an employment-extended multi-regional input–output (EE-MRIO) model. Let the vector Qdenote the number of employed persons in each sector of each region. The direct employment intensity of each sector, denoted by q, is defined as $q = Q/X$, which represents the amount of direct employment input required per unit of output. Accordingly, the EE-

MRIO model can be expressed as $Q = q(I - A)^{-1}Y$. Ultimately, the paper estimates the direct and indirect employment required to satisfy final consumption in a given sector of a given region. This captures the employment-driving mechanism formed through supply-chain procurement relationships among industries rather than simply job growth within the local transportation sector.

3. Data Sources and Processing

Following the Standards, this paper splits the sectors in the traditional non-competitive input-output table into logistics and traditional industries. The required basic data consist of two parts: China's input-output tables and sectoral employment data. China's input-output tables are derived from the non-competitive input-output tables reflecting processing trade, provided by the Global Value Chain Research Group of the Academy of Mathematics and Systems Science, Chinese Academy of Sciences, and then aggregated into 139-sector, 149-sector, 153-sector, and 211-sector non-competitive input-output tables for 2012, 2017, 2020, and 2023, respectively. The 2012, 2017, and 2020 multi-regional input-output tables used in this paper are from the CEADs database.

The compilation of the employment vectors mainly follows Zhang and Yang (2022). Specifically, using data on total employment and employment in the three broad industries from the China Statistical Yearbook for 2012, 2017, 2020, and 2023, together with more detailed sectoral employment data from the China Economic Census Yearbook for the nearby years 2013, 2018, and 2023 as the structural basis of the employment vectors, we construct employment vectors for 2012, 2017, 2020, and 2023 that are consistent with the sectoral classification of the input-output tables.

The key difficulty in compiling logistics industry input-output tables lies in splitting the sectors in the input-output table into traditional industries and the logistics industry, that is, isolating the relevant logistics-related portions embedded in all national economic sectors. The separation method used in this paper follows Xu and Zhang (2020), who employ the proportional coefficient method to separate the relevant components embedded in all sectors of the national economy. This method is more conducive to splitting intermediate inputs in the input-output table. Therefore, this paper mainly adopts the proportional coefficient method and splits the benchmark input-output table according to a given decomposition ratio.

Specifically, the procedure for converting the full input–output table into the logistics-sector input–output table is as follows. Let the intermediate transaction matrix in Quadrant I of the full $(n \times n)$input–output table be denoted as $\hat{Z}_{n\times n}$; the final use matrix in Quadrant II be denoted as $\hat{R}_{n\times 8}$; and the primary input matrix in Quadrant III be denoted as $\hat{C}_{4\times n}$. In the 20×20 logistics-sector input–output table, the intermediate transaction matrix in Quadrant I is denoted as $\hat{Z}_{20\times 20}$, the final use matrix in Quadrant II as $\hat{R}_{20\times 8}$, and the primary input matrix in Quadrant III as $\hat{C}_{4\times 20}$. By applying the conversion coefficient matrix, the transformation from the original input–output table to the 20-sector table can be expressed as follows:

$$Z_{20,20}=P_{20,\mathrm{n}}Z_{\mathrm{n,n}}P_{\mathrm{n},20} \tag{7}$$

$$R_{20,8}=P_{20,\mathrm{n}}R_{\mathrm{n},8} \tag{8}$$

$$C_{4,20}=C_{4,\mathrm{n}}P_{\mathrm{n},20} \tag{9}$$

According to the above formulas, the output value of logistics and transportation activities embedded in traditional industry sectors is separated out and classified into the logistics industry sector, while the remaining output values are aggregated into non-logistics sectors such as agriculture, forestry, animal husbandry, and fishery, manufacturing, and wholesale and retail trade. The decomposition coefficients in this paper are measured by using the shares of operating revenue or other income indicators at the industry level as proxies for value-added shares to calculate the logistics decomposition coefficients. On this basis, we compile 20-sector input-output tables that distinguish the logistics industry for 2012, 2017, 2020, and 2023.

4. Industrial Linkage Analysis Between the Logistics Industry and Traditional Industries

This study analyzes the industrial linkages between the logistics industry and traditional industries, as well as their evolution trends, based on the input–output tables for the years 2012, 2017, 2020, and 2023. Specifically, using the direct consumption coefficients $a_{ij}$and the complete consumption coefficients b_{ij}in the model, we calculate the proportion of logistics output directly and completely consumed in the production of one unit of final product in traditional industries relative to the total output of all industries directly and completely consumed. This proportion reflects the direct and complete production dependence of traditional industries on the logistics sector. The industrial linkage between the logistics industry and traditional industries is then characterized by the estimated production dependence.

Figures 1 and 2 show that, among traditional industries, transportation and wholesale and retail trade generally exhibit relatively high dependence on the logistics industry. For example, in 2023, the direct and total dependence of transportation and wholesale and retail trade on the logistics industry both exceeded 0.10 and 0.08, respectively, whereas service sectors such as resident services, technical services, and business services showed relatively low dependence, with both direct and total dependence below 0.06. In terms of trends, the dependence of service industries on the logistics industry fluctuates over time, while the dependence of upstream supply-chain industries on the logistics industry has increased more markedly, especially in the primary sector, mining, and manufacturing.

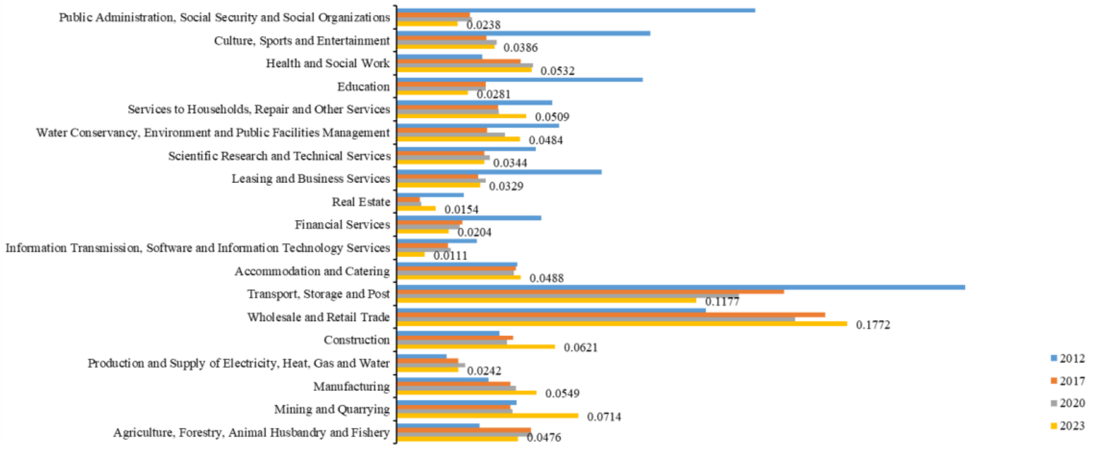

Figure 1. Direct Dependence of Other Industries on the Logistics Industry

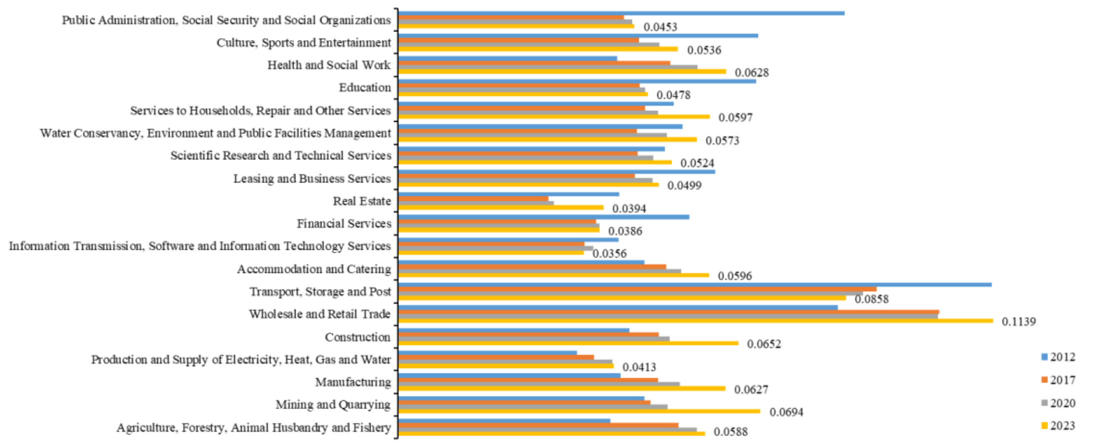

Figure 2. Total Dependence of Other Industries on the Logistics Industry

5. The Role of the Logistics Industry in Promoting China's Economic and Employment Growth

Table 1 reports the contribution of the logistics industry to China's total value added and aggregate employment in 2012, 2017, and 2023. In terms of contribution to total GDP, the absolute contribution of the logistics industry to GDP increased year by year, indicating a continuous expansion in the scale of China's logistics industry. Looking at specific transmission paths, in 2012 the logistics industry contributed to GDP mainly through the path in which it stimulated traditional industries, whereas the path in which traditional industries stimulated the logistics industry made the smallest contribution to GDP. In addition, the production of the logistics industry depends relatively heavily on traditional industries, while the dependence of traditional industries on the logistics industry is relatively lower. Therefore, within the linked industrial chain, the contribution of the path in which the logistics industry stimulates traditional industries to GDP is much larger than that of the path in which traditional industries stimulate the logistics industry. In 2017, within the total contribution of the logistics industry to GDP, the contribution of the path in which the logistics industry stimulates traditional industries increased by 0.34 percentage points relative to 2012, the contribution of the pure logistics industry chain path increased by 0.29 percentage points, and the contribution of the path in which traditional industries stimulate the logistics industry decreased by 0.14 percentage points. In 2020, compared with 2017, the contribution of the pure logistics industry chain path and the contribution of the path in which the logistics industry stimulates traditional industries to GDP declined by 0.26 and 0.58 percentage points, respectively, whereas the contribution of the path in which traditional industries stimulate the logistics industry increased by 0.12 percentage points. In 2023, compared with 2020, the contributions of the pure logistics industry chain path and the path in which traditional industries stimulate the logistics industry to GDP decreased by 0.20 and 0.13 percentage points, respectively. By contrast, the contribution of the path in which the logistics industry stimulates traditional industries increased by 0.13 percentage points, indicating that, as the logistics industry develops, its ties with various industries become increasingly close and its contribution to GDP becomes more substantial. At the same time, as greater attention is paid to reducing logistics costs, the share of logistics in GDP has declined somewhat. Overall, from 2012 to 2023, the scale of the logistics industry continued to expand, while logistics costs also fell.

In terms of contribution to aggregate employment, the contribution of the logistics industry to China's total employment shows an overall upward trend, indicating that as the logistics industry continues to grow, its capacity to absorb labor also strengthens. From 2012 to 2023, the trend in the logistics industry's contribution to total employment is broadly consistent with the trend in its contribution to total GDP. In 2012, as China vigorously promoted the development of the logistics industry and downstream supply-chain sectors exhibited relatively high dependence on it, the logistics industry's pull on employment in downstream traditional industries strengthened, while the pull of traditional industries on logistics employment remained relatively small. From 2012 to 2020, as the logistics industry expanded and its integration with traditional industries deepened, both the logistics industry's pull on traditional-industry employment and the employment effect of the pure logistics industry chain path increased in their contributions to total employment, whereas the pull of traditional industries on logistics employment declined. It can be seen that the increase in the contribution of the logistics industry's pull on traditional-industry employment was the largest. In 2023, due to the impact of the pandemic, downstream firms in the supply chain were more severely affected. Relative to 2020, all three transmission paths of the logistics industry's contribution to total employment declined, suggesting that the employment effects of the logistics industry mainly operate through downstream firms in the supply chain.

Table 1. Contribution of the Logistics Industry to China’s GDP and Aggregate Employment

			2012	2017	2020	2023
Panel A: Impact of the Logistics Industry on China’s GDP						RMB 100 million; %
GDP	Logistics industry chain path	Value	85146145	153953310	164188117	184219069
		Share	1.587739	1.870145	1.615354	1.416018
	Logistics industry stimulating traditional industries	Value	206426680	344682069	365997208	485741474
		Share	3.849284	4.18702	3.600839	3.733701
	Traditional industries stimulating the logistics industry	Value	83254751	116664866	155796176	182050997
		Share	1.55247	1.417185	1.53279	1.399353
	Total	Value	374827576	615300246	685981501	852011540
		Share	6.989492	7.47435	6.748983	6.549072
Panel B: Impact of the Logistics Industry on China’s Employment						10,000 persons; %
Employment	Logistics industry chain path	Value	217703747	284310286	325803013	235340650
		Share	1.428842	1.611386	1.912092	1.437783
	Logistics industry stimulating traditional industries	Value	527796786	636534919	726258364	620536813
		Share	3.464058	3.60769	4.262308	3.791088
	Traditional industries stimulating the logistics industry	Value	171636258	178035064	173191548	164261904
		Share	1.12649	1.00905	1.016437	1.003536
	Total	Value	917136792	1098880269	1225252925	1020139367
		Share	6.019391	6.228126	7.190836	6.232407

6. Employment Effects of the Logistics Supply Chain: Evidence from a Multi-Regional Input-Output Perspective

As shown above, the logistics industry mainly drives GDP growth and employment growth in downstream supply-chain sectors. To better understand the employment effects of the logistics industry in the context of a unified national market, this paper studies the interregional employment effects of the logistics industry based on the multi-regional input-output tables for 31 provinces in 2012, 2017, and 2020.

To measure the role and importance of regional logistics sectors within the national industrial network, we calculated network centrality indicators based on direct consumption coefficients. In order to preserve the intensity of economic linkages, we employ weighted centrality measures, including out-strength and in-strength. Specifically, the out-strength $S_i^{out} = \sum_{j=1}^{n} a_{ij}$ captures the forward influence of a sector, while the in-strength $S_i^{in} == \sum_{i=1}^{n} a_{ij}$ reflects its backward pulling effect. Finally, the total strength $S_i^{total} = S_i^{out} + S_i^{in}$ is used to comprehensively evaluate the degree to which a sector participates as a core node within the industrial chain.

Table 2 reports the node centrality and ranking of the logistics industry in each region when serving as an intermediate sector in the supply chain in 2012, 2017, and 2020. Regions with leading logistics centrality often rely on their locational advantages and transportation networks to undertake cross-regional functions of cargo transshipment and distribution. The development level of the logistics industry in these regions therefore directly affects the efficiency of supply chains across a broader geographical area. Table 2 shows that the logistics industries in Beijing, Shanghai, and Guangdong are strongly connected with industries across regions. In addition, Henan, as a major transportation hub in China, plays an important role in the national market circulation through the development of its logistics industry.

Table 2. Centrality of Regional Logistics Sectors, 2012–2020

2012		2017		2020	
Region	Centrality	Region	Centrality	Region	Centrality
Shanghai	1.884685	Shanghai	2.11867	Shanghai	6.476806
Tianjin	1.712902	Henan	1.911449	Guangdong	4.255693
Hebei	1.677249	Inner Mongolia	1.762589	Jiangsu	4.254601
Beijing	1.549813	Zhejiang	1.609218	Beijing	3.91712
Jiangsu	1.527675	Shandong	1.553192	Henan	3.814736

Note: Due to space limitations, Table 2 reports only the top five regional logistics sectors by centrality in each year.

Next, this paper identifies the logistics industry value-chain pathways with the largest employment contributions, as reported in Table 3. In 2020, the industries most strongly driving logistics-related employment across regions were predominantly within the manufacturing sector of Jiangsu Province. This pattern can be attributed to the well-developed manufacturing base in Jiangsu Province, particularly in logistics equipment and intelligent manufacturing equipment. The large number of firms and the substantial industrial scale in these sectors have shaped the supply–demand relationships along the upstream and downstream segments of the industrial chain, thereby guiding the primary direction of logistics supply-chain extension across regions. This suggests that manufacturing-strong provinces in eastern China play a foundational role in supporting logistics-related employment nationwide.

Table 3. Key Logistics Industry Chain Paths with Employment Contributions, 2012–2020

2012	Employment-driving sector	2017	Employment-driving sector	2020	Employment-driving sector
Beijing	Manufacturing in Shandong	Beijing	Manufacturing in Shandong	Beijing	Manufacturing in Jiangsu
Tianjin	Manufacturing in Jiangsu	Tianjin	Manufacturing in Jiangsu	Tianjin	Manufacturing in Jiangsu
Hebei	Manufacturing in Shandong	Hebei	Manufacturing in Shandong	Hebei	Manufacturing in Jiangsu
Shanxi	Manufacturing in Jiangsu	Shanxi	Manufacturing in Guangdong	Shanxi	Manufacturing in Jiangsu
Inner Mongolia	Manufacturing in Shandong	Inner Mongolia	Manufacturing in Jiangsu	Inner Mongolia	Manufacturing in Jiangsu
Heilongjiang	Manufacturing in Jiangsu	Heilongjiang	Manufacturing in Jiangsu	Heilongjiang	Manufacturing in Jiangsu
Jilin	Manufacturing in Jiangsu	Jilin	Manufacturing in Jiangsu	Jilin	Manufacturing in Jiangsu
Liaoning	Manufacturing in Shandong	Liaoning	Manufacturing in Jiangsu	Liaoning	Manufacturing in Jiangsu
Shanghai	Manufacturing in Shandong	Shanghai	Manufacturing in Shandong	Shanghai	Manufacturing in Jiangsu
Jiangsu	Manufacturing in Shandong	Jiangsu	Manufacturing in Shandong	Jiangsu	Manufacturing in Guangdong
Zhejiang	Manufacturing in Shandong	Zhejiang	Manufacturing in Jiangsu	Zhejiang	Manufacturing in Jiangsu
Anhui	Manufacturing in Shandong	Anhui	Manufacturing in Jiangsu	Anhui	Manufacturing in Jiangsu
Fujian	Manufacturing in Jiangsu	Fujian	Manufacturing in Guangdong	Fujian	Manufacturing in Jiangsu
Jiangxi	Manufacturing in Jiangsu	Jiangxi	Manufacturing in Jiangsu	Jiangxi	Manufacturing in Jiangsu
Shandong	Manufacturing in Jiangsu	Shandong	Manufacturing in Jiangsu	Shandong	Manufacturing in Jiangsu
Henan	Manufacturing in Shandong	Henan	Manufacturing in Jiangsu	Henan	Manufacturing in Jiangsu
Hubei	Manufacturing in Shandong	Hubei	Manufacturing in Guangdong	Hubei	Manufacturing in Jiangsu
Hunan	Manufacturing in Shandong	Hunan	Manufacturing in Guangdong	Hunan	Manufacturing in Jiangsu
Guangdong	Manufacturing in Jiangsu	Guangdong	Manufacturing in Jiangsu	Guangdong	Manufacturing in Jiangsu
Guangxi	Manufacturing in Jiangsu	Guangxi	Manufacturing in Guangdong	Guangxi	Manufacturing in Jiangsu
Hainan	Manufacturing in Jiangsu	Hainan	Manufacturing in Guangdong	Hainan	Manufacturing in Jiangsu
Chongqing	Manufacturing in Shandong	Chongqing	Manufacturing in Shandong	Chongqing	Manufacturing in Jiangsu
Sichuan	Manufacturing in Jiangsu	Sichuan	Manufacturing in Guangdong	Sichuan	Manufacturing in Jiangsu

Guizhou	Manufacturing in Shandong	Guizhou	Manufacturing in Guangdong	Guizhou	Manufacturing in Jiangsu
Yunnan	Manufacturing in Jiangsu	Yunnan	Manufacturing in Guangdong	Yunnan	Manufacturing in Jiangsu
Xizang	Manufacturing in Shandong	Xizang	Manufacturing in Guangdong	Xizang	Manufacturing in Jiangsu
Shaanxi	Manufacturing in Jiangsu	Shaanxi	Manufacturing in Jiangsu	Shaanxi	Manufacturing in Jiangsu
Gansu	Manufacturing in Jiangsu	Gansu	Manufacturing in Guangdong	Gansu	Manufacturing in Jiangsu
Ningxia	Manufacturing in Jiangsu	Ningxia	Manufacturing in Jiangsu	Ningxia	Manufacturing in Jiangsu
Qinghai	Manufacturing in Jiangsu	Qinghai	Manufacturing in Jiangsu	Qinghai	Manufacturing in Jiangsu
Xinjiang	Manufacturing in Jiangsu	Xinjiang	Manufacturing in Guangdong	Xinjiang	Manufacturing in Jiangsu

Subsequently, this paper compares the employment effects of the logistics industry across regions in 2012, 2017, and 2020. The results are presented in Figure 3. This indicator quantifies the total direct and indirect labor input induced by a unit of logistics service consumption. In other words, it not only captures the employment absorption of the logistics industry itself but also includes the jobs generated in upstream industries that provide intermediate inputs to the logistics sector. As the logistics industry develops, the employment effects of the logistics industry in remote regions with border ports, such as Heilongjiang Province, the Xizang Autonomous Region, and the Xinjiang Uygur Autonomous Region, increase significantly. This suggests that the development of the logistics industry promotes the inflow of goods from border regions to other regions, thereby stimulating the development of downstream industries and increasing employment in downstream industries elsewhere. In addition, the development of the logistics industry in central regions, such as Jiangxi Province and Henan Province, also exhibits significant employment effects. As nodes in the domestic transportation network, central regions play a hub role. The development of the logistics industry there can accelerate the circulation of goods in surrounding regions, improve supply-chain efficiency, more closely connect upstream and downstream industries, and thereby drive employment in downstream industries in neighboring regions.

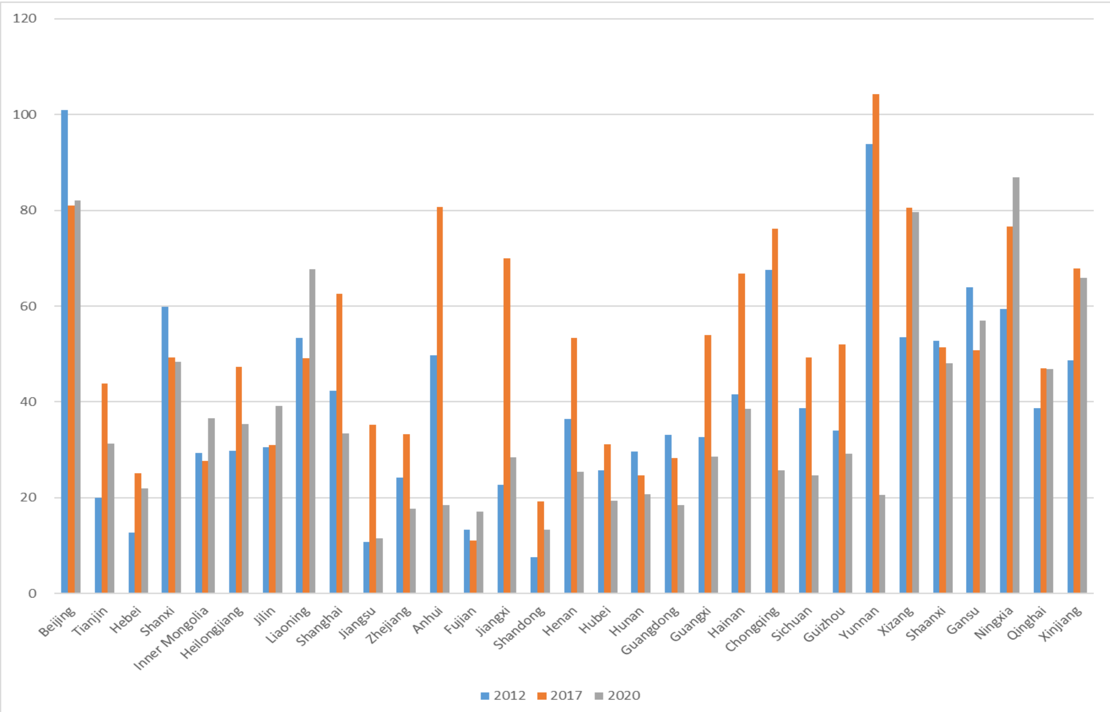

Figure 3. Estimated Contribution of the Logistics Industry in Each Region to China's Employment

7. Conclusions and Policy Implications

This paper constructs an input-output model reflecting the logistics industry and, based on the Standards, compiles 20-sector input-output tables for China for 2012, 2017, 2020, and 2023. Within the input-output framework, it estimates the impact of the logistics industry on China's economy and employment. The main conclusions are as follows.

First, in terms of the linkage between the logistics industry and traditional industries, from 2012 to 2023 the dependence of upstream supply-chain industries on the logistics industry increased significantly, especially in the primary sector, mining, and manufacturing. By contrast, the dependence of some service industries on the logistics industry fluctuated substantially, reflecting heterogeneity and dynamic evolution in the linkage structure between the logistics industry and different industries.

Second, if the input-output linkages between the logistics industry and traditional industries are ignored and only the direct contribution of the logistics industry itself to GDP and employment is counted, the value added and employment indirectly induced in traditional industries through industrial linkage channels will be omitted, leading to a systematic underestimation of the economic and employment contributions of the logistics industry. Using the 2023 data as an example, ignoring industrial linkage effects would underestimate the contribution of the logistics industry to China's GDP and aggregate employment by about 3.73% and 3.79%, respectively.

Third, from 2012 to 2023, the total contribution of the logistics industry to GDP and employment continued to grow, indicating that it has gradually become an important engine supporting China's economic growth and employment growth. Notably, the value added and employment indirectly contributed by the logistics industry through traditional industries have exceeded its direct contribution, and the gap has widened over time, further highlighting the transmission and amplification role of the logistics industry in the national economy.

Fourth, at the regional level, the logistics industries in Beijing, Shanghai, Guangdong, and Henan play key hub roles in the national market network. The employment effects driven by the logistics industry are concentrated mainly in the manufacturing sectors of Jiangsu, Shandong, and Guangdong. Meanwhile, with the continuous improvement of the logistics system, employment growth driven by logistics development has become particularly prominent in border-port regions and central transportation hubs, demonstrating strong regional spillover potential.

Based on the above findings, this paper proposes the following policy implications. First, it is necessary to strengthen the integrated development of the logistics industry with upstream industries, especially key sectors such as manufacturing and mining, and to promote coordinated optimization of industrial and supply chains. Logistics firms and manufacturing firms should be encouraged to establish long-term strategic partnerships and to develop customized and integrated supply-chain services, thereby enhancing the supporting role of the logistics system for the real economy. Second, the input-output statistical and accounting system should be improved to strengthen full-caliber measurement of the value-added and employment contributions of the logistics industry. When conducting national economic accounting, relevant authorities should fully consider the linkage effects between the logistics industry and traditional industries and build a multidimensional evaluation framework that captures inter-industry transmission mechanisms, so as to avoid misallocation of policy resources caused by biased measurement. Third, the role of the logistics industry as a new driver of economic growth should continue to be leveraged by further strengthening policy support for logistics infrastructure construction. In particular, in promoting the coordinated development of the modern logistics system and the regional industrial layout, resource allocation should be optimized, and the construction of key corridors, node cities, and logistics hubs should be strengthened so as to improve the overall operating efficiency of the logistics network. Fourth, region-specific efforts should be made to promote coordinated regional logistics development. Beijing, Shanghai, Guangdong, Henan, and other key hub regions should be supported in further enhancing their radiating and driving roles. Manufacturing agglomeration areas such as Jiangsu, Shandong, and Guangdong should be encouraged to deepen the joint development of the two industries and enhance the labor-absorbing capacity of logistics. At the same time, stronger policy support should be provided to emerging logistics growth areas such as border-port regions and central transportation hubs. Through complementary policies in taxation, land use, and talent, their employment and industrial linkage potential can be further stimulated.

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