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Input-output structure characteristics analysis on Mongolia

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ABSTRACT

In recent years, Mongolia has introduced a number of policies to promote economic growth and international cooperation. Analyzing the evolution of Mongolia's economic structure with the help of macroeconomic data such as input-output is helpful to systematically evaluate the effectiveness of its policies. Based on the input-output table of Mongolia provided by the Eora National Input-Output Database, this paper systematically analyzes the input-output structure characteristics of Mongolia's national economy from 2015 to 2021. The research content mainly starts from the three economic links of intermediate input and intermediate use, final use and initial input, revealing the core characteristics of Mongolia in industrial linkage, resource allocation and economic structure. On this basis, the potential impact of Mongolia's participation in regional economic cooperation on its input-output structure and industrial development under the background of the implementation of the "Steppe Road" initiative is further explored. The research results help to understand the internal logic of Mongolia's economic structure and provide a reference for policymakers in promoting economic diversification and enhancing the resilience of the domestic industrial chain.

KEYWORDS

Input-output analysis, National economy, Economic structure, Regional cooperation, Mongolia

1. INTRODUCTION

In recent years, in order to achieve economic stability and sustainable development, Mongolia has successively promulgated and implemented a series of policies aimed at optimizing the industrial structure, promoting foreign cooperation, and promoting the transformation of the resource-based economy to diversification. Against this background, in-depth analysis of the operating characteristics and evolution path of Mongolia's economic structure is of great significance for evaluating policy effectiveness and guiding future development. As an important tool for macroeconomic structure research, input-output analysis can systematically depict the relationship between various sectors of the national economy, reveal the efficiency of resource allocation, the degree of industrial correlation, and the economic operation mechanism. This paper intends to use input-output table data to conduct a multi-dimensional analysis of the key structural characteristics of Mongolia's economy, and provide theoretical support for understanding its economic operation model and development potential.

This paper uses the input-output table of Mongolia from 2015 to 2021 provided by the Eora multi-regional input-output database as the main data source[Error! Reference source not found.] The Eora database covers more than 190 countries and regions in the world, and the data covers multiple time series, with high comparability and completeness, which is suitable for national economic structure research. This paper conducts a detailed analysis around the three main links of the input-output system, namely intermediate inputs and intermediate uses, final uses and initial inputs. Through the analysis of the intermediate input and use structure, the dependence relationship and internal circulation characteristics between the main industries are identified; the final use structure part reflects the value and composition of goods or services produced by various product sectors in Mongolia for internal and external demand; the initial input part shows the distribution characteristics of factors such as labor and capital in various industries.

In addition, this paper also explores the structural changes and external linkage effects of Mongolia's economy under the framework of the Belt and Road Initiative from the perspective of regional cooperation and outward-oriented development, combined with the background of the "Steppe Road" initiative. As an important strategy for Mongolia to strengthen economic ties with neighboring countries and expand trade and investment channels, the "Steppe Road" may have a profound impact on its industrial structure and input-output relationship. Therefore, based on structural analysis, this paper attempts to explore the potential correlation between the initiative and Mongolia's macroeconomic data.

Overall, this paper hopes to provide a systematic and practical analytical framework through the application of the input-output model in the study of Mongolia's economic structure, and provide theoretical support and empirical reference for Mongolian economic policy makers and related research.

2. INPUT-OUTPUT STRUCTURE CHARACTERISTICS OF MONGOLIA

2.1. Intermediate Inputs and Intermediate Use

From 2015 to 2021, Mongolia's intermediate goods output exhibited an overall upward trend with notable fluctuations (Figure 1). During 2015–2018, the intermediate goods output demonstrated rapid yet volatile growth, reflecting strong production-driven momentum and resource mobilization effects in the economy. Between 2019 and 2021, output stabilized around $11 billion with minor variations, suggesting a maturing industrial structure and moderated growth dynamics.In summary, Mongolia's intermediate goods production transitioned from initial rapid expansion to stabilization after a brief downturn, revealing both external market/policy-induced volatility and structural consolidation within supply chains over this medium-term period.

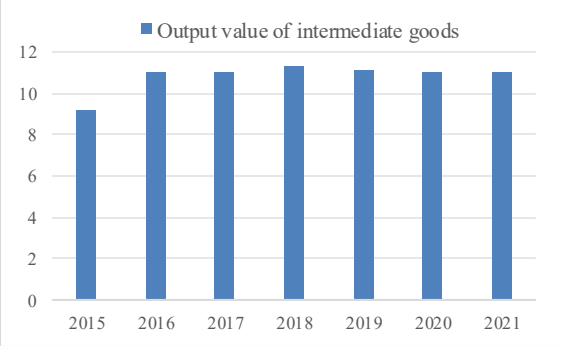

Figure 1. 2015-2021 Output value of intermediate goods in Mongolia (Unit: Billion USD)

In 2021, the "Financial Intermediation and Business Activities" sector contributed the largest share of intermediate input value to the economy, accounting for 24.66% of total output, followed by the Agriculture sector (10.22%) and the Petroleum, Chemical and Non-Metallic Mineral Products sector

(8.05%). This indicates that these industries supplied a substantial volume of intermediate goods and services to other sectors. Specifically, from the supply side, the "Financial Intermediation and Business Activities" sector allocated the highest proportion of its intermediate inputs to the Transport (13.68%), Education, Health and Other Services (10.89%), and Public Administration (10.06%) sectors.

From the perspective of intermediate use, the Mining and Quarrying sector consumed the highest share of intermediate inputs from other industries, accounting for 11.52% of total output, followed by the Transport (10.30%) and Agriculture (8.01%) sectors. Further analysis reveals that: Mining and Quarrying primarily relied on intra-sectoral inputs, constituting 32.90% of its total intermediate use. And the Transport sector heavily depended on intermediate inputs from "Financial Intermediation and Business Activities", which accounted for 32.76% of its intermediate consumption—exceeding its own intra-sectoral input share (26.29%). These findings highlight that the interlinkages between "Financial Intermediation and Business Activities" and "Transport" were a dominant economic driver in Mongolia's 2021 input-output structure, having a strong driving effect on the economy.

Unlike inter-sectoral economic linkages, intra-sectoral intermediate input-output relationships more strongly reflect an industry's internal integration. For instance, sectors such as Agriculture, Mining and Quarrying, and Post and Telecommunications exhibit the strongest internal linkages—meaning their intermediate use and input dependencies are primarily concentrated within their own sectors compared to other industries.

During 2015–2021, sectors with the largest shares of intermediate inputs in Mongolia were consistently "Financial Intermediation and Business Activities" and "Agriculture", while those with the highest intermediate use were predominantly "Mining and Quarrying" and "Transport". In summary, these sectors exerted substantial influence on Mongolia's domestic economy, serving as key drivers of economic activity with strong multiplier effects.

2.2. Final Use

Mongolia's aggregate final use exhibited marked fluctuations with an upward trend during 2015-2021, registering a compound annual growth rate (CAGR) of approximately 5.0%.

From the perspective of GDP accounting by the expenditure method, final use includes final consumption expenditure, gross capital formation, and net exports of goods and services, which are figuratively referred to as the "three horses" that drive economic growth. Final consumption expenditure reflects consumption demand, and in this study is equal to the sum of household final consumption, non-profit organizations serving households, and government final consumption; gross capital formation reflects investment demand, and in this study is equal to the sum of gross fixed capital formation, inventory changes, and acquisitions of valuables minus disposals; net exports of goods and services reflect external demand, which refers to the difference between exports of goods and services and imports of goods and services.

By calculating Mongolia's consumption rate and investment rate from 2015 to 2021, it can be seen that the final consumption rate increased from about 60% in 2015 to about 75% in 2016, and remained stable at about 70% from 2017 to 2021. The capital formation rate decreased from 26% in 2015 to about 12% in 2016, and then rebounded and stabilized at around 17% from 2018 to 2021 (Figure 2). Based on the above analysis, it can be seen that the proportion of Mongolia's final consumption expenditure in GDP is significantly higher than the proportion of capital formation.

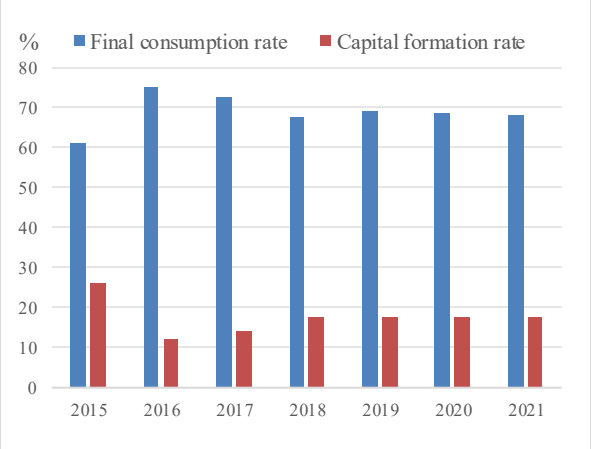

Figure 2. 2015-2021 Consumption and investment rates in Mongolia

Analysis of the composition of Mongolia's final consumption expenditure shows that Household final consumption accounts for the largest proportion, while Government final consumption accounts for a smaller proportion, with an average proportion of 85% and 15% respectively during the research period, and the proportion of Non-profit institutions serving households is almost 0 (Figure 3). It can be seen that Household final consumption directly reflects the core needs of residents' daily life and economic activities,

which is in line with the general law of economic development.

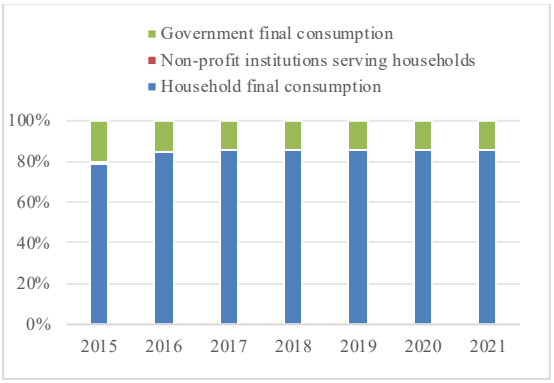

Figure 3. 2015-2021 Composition of final consumption expenditure in Mongolia

In 2021, the final consumption of "Food & Beverages" in Mongolia's household final consumption expenditure was the largest, accounting for 26.78%. The second largest primary sectors with relatively large household final consumption expenditure were "Electricity, Gas and Water" and "Transport", accounting for 21.41% and 17.91% respectively (Figure 4).

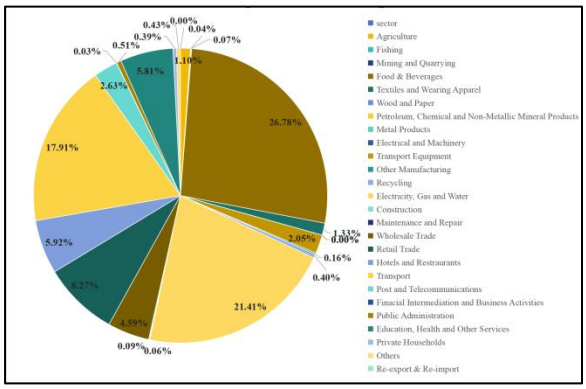

Figure 4. Composition of household final consumption expenditure in Mongolia in 2021

2.3. Initial Investment

By calculating the proportion of initial input composition of each industrial sector, the main source of cost of the industry can be clarified. In this study, the initial input sources of various sectors in Mongolia's secondary industry in 2021 mainly come from Compensation of employees and Net operating surplus. Among them, the main initial input source of the four sectors of Mining and Quarrying, Food & Beverages, Petroleum, Chemical and Non-Metallic Mineral Products and Electricity, Gas and Water is Net operating surplus, indicating that they are capital-intensive industries, while other industrial sectors in the secondary industry are all low-value-added labor-intensive industries. In the primary and tertiary industries, Net mixed income and Compensation of employees are the main sources of initial input, indicating that these industrial sectors are mostly self-employed/family-dominated industries, with low added value, labor-intensive, and low-tech industry characteristics. This is consistent with Mongolia's policy orientation of private economy dominance[1].

3. DISCUSSION

Since the "Steppe Road" strategy was proposed in September 2014 and approved in 2017, it has served as the core framework for Mongolia's development and has significantly promoted the structural upgrade of key sectors such as transportation, energy, trade and tourism[3]. In the field of transportation, through the construction and renovation of about 997 kilometers of highway hubs (such as the trunk line running through Ulaanbaatar to Zamyn-Uud), logistics efficiency has increased by 40%, and infrastructure investment along the route has increased by 25%; the energy sector has relied on the China-Russia cross-border power grid interconnection project to increase the proportion of renewable energy power generation from 5% to 15%, and realize electricity exports for the first time in 2023; in the trade sector, due to the tariff preferential agreement of the China-Mongolia-Russia Economic Corridor, the customs clearance time for mineral product exports has been shortened by 60%, and the coal exports to China in 2022 exceeded 36.5 million tons, setting a record high. This strategy has formed a deep connection with China's "Belt and Road" and Russia's "Eurasian Economic Union". This cooperation model has not only kept Mongolia's GDP growth rate above 5.5% for three consecutive years (2021-2023), but also injected sustainable momentum into Mongolia's economic diversification through technology transfer and talent training programs.[4][5] These positive impacts are reflected in all aspects of input-output macro data. 2021 is the seventh year since the "Steppe Road" strategy was proposed. During this period, Mongolia's economic indicators showed an upward trend, and the development of industrial sectors such as transportation, mining and quarrying showed strong momentum. In the future, in-depth cooperation in the China-Mongolia-Russia Economic Corridor will inject strong impetus into Mongolia's economy, accelerate its transformation of its resource-based economy to diversification and modernization, and significantly improve the level of regional economic integration.

4. CONCLUSION

Based on the input-output table of Mongolia provided by the Eora National Input-Output Database, this paper systematically analyzes the input-output structure characteristics of Mongolia's national economy from 2015 to 2021, and the main conclusions are as follows:

1. Overall, Mongolia's total economic volume showed a significant fluctuation growth feature from 2015 to 2021.
2. From 2015 to 2021, the industrial sectors with a relatively large proportion of intermediate inputs in Mongolia were "Finacial Intermediation and Business Activities", "Agriculture", etc., and the industrial sectors with a relatively large proportion of intermediate use were "Mining and Quarrying", and "Transport". The intermediate inputs of "Finacial Intermediation and Business Activities" to the "Transport" sector and the intermediate use of the "Transport" sector to the "Finacial Intermediation and Business Activities" were the main economic activities of Mongolia in 2021. These industrial sectors have a strong impact on Mongolia's internal economy and have played a strong role in driving it.
3. In the primary and tertiary industries, Net mixed income and Compensation of employees are the main sources of initial input, indicating that these industrial sectors are mostly self-employed/family-dominated industries with low added value, labor-intensive, and low-tech industry characteristics. This is consistent with Mongolia's policy orientation of private economy dominating.

The results of this study help understand the economic development of Mongolia in recent years and its internal development logic.

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