Research on Prosperity Index of China's Coastal Cargo Port Enterprises

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Abstract. As the core hub of domestic and international trade circulation, coastal cargo port enterprises undertake the important function of connecting inland economic regions and overseas markets, and their operating prosperity directly reflects the development vitality of the port logistics industry and the macroeconomic operation status of foreign trade. In recent years, against the background of fluctuating global shipping markets, restructuring domestic industrial chains, and accelerating green and intelligent transformation of ports, the operating conditions of China's coastal cargo port enterprises have shown obvious structural differentiation and periodic volatility. To scientifically quantify the operating development status of coastal cargo port enterprises, identify industry operation laws and potential risks, this paper constructs a multi-dimensional prosperity index evaluation system covering operational scale, operational efficiency, profitability, market confidence and development potential based on the economic cycle theory and port industry operational characteristics. Taking China's major coastal cargo port enterprises as the research sample, this paper adopts the seasonal adjustment method and equal-weight synthesis model to measure the prosperity level of the port industry from 2023 to 2026,analyzes the periodic fluctuation characteristics and key influencing factors of enterprise prosperity, and explores the prominent problems such as homogeneous competition, slowing throughput growth and increasing transformation costs faced by current coastal cargo port enterprises. The research results show that the prosperity index of China's coastal cargo port enterprises maintains a slight prosperity range with obvious quarterly fluctuations; traditional business scale advantage gradually weakens, and intelligent and green transformation capabilities have become core factors affecting enterprise prosperity; macro foreign trade situation, shipping market price fluctuations and industrial policy adjustments are the main external driving forces of index changes. Finally, targeted optimization strategies are proposed from the aspects of differentiated operation, digital transformation, cost control and industrial collaborative development, so as to provide empirical support and decision-making reference for the stable and high-quality development of coastal cargo port enterprises and the healthy operation of the port logistics industry.

Keywords: Coastal Cargo Port Enterprises; Prosperity Index; Industry Fluctuation; High-quality Development

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1 Introduction

At present, most prosperity indices for ports and shipping[1-3] mainly focus on the shipping industry. The most renowned ones are price indices represented by the Baltic Exchange Index series, namely freight rate indices. Since price indices only reflect changes in the transaction prices of market targets and cannot accurately reflect investors' profitability levels from such targets, some institutions have developed profitability indices for investors targeting specific products, such as those compiled by Clarksons. Other institutions have constructed prosperity indices reflecting the overall market conditions, including the Shanghai Shipping Index (SSI) jointly developed by the China Center for International Economic Exchanges and Shanghai Jiao Tong University, the Yangtze River Shipping Prosperity Index issued by the Changjiang River Administration of Navigational Affairs under the Ministry of Transport, and the China Shipping Prosperity Index and Global Shipping Prosperity Index released by the Shanghai International Shipping Institute.

The Yangtze River Shipping Prosperity Index draws on the business survey methodology of the German Institute for Economic Research, calculating prosperity levels based on entrepreneurs' judgments on the current development of the Yangtze River shipping economy. In 2009, a series of prosperity indices tailored to China's maritime shipping industry were released by the Shanghai International Shipping Center, mostly adopting data mining methods to compile the China Shipping Early Warning Index and Shipping Climate Trend Index. In 2010, the SSI issued by the China Center for International Economic Exchanges and Shanghai Jiao Tong University became the first prosperity index in the world targeting the global maritime market, comprehensively incorporating freight rates, transport capacity, crude oil prices and other indicators[4]. In 2015, Chen[5] conducted research on the construction of regional prosperity indices, with a focus on the container shipping market and dry bulk shipping market in Shanghai.

The existing shipping prosperity indexes mostly focus on macro shipping market operation, lacking targeted measurement for the status of cargo port enterprises. Therefore, it is urgent to construct a targeted prosperity index system suitable for the development characteristics of coastal cargo port enterprises, accurately grasp the industry operation rules, and provide theoretical support for enterprises to cope with market fluctuations and realize high-quality development.

2 Current Operation Status of China's Coastal Cargo Port Enterprises

2.1 Overall Operation Scale is Stable

In recent years, China's coastal cargo ports have maintained a stable throughput scale. Benefiting from the steady growth of domestic foreign trade and the continuous improvement of port infrastructure construction, the total cargo throughput and container throughput of coastal ports have maintained a positive growth trend, laying a solid

foundation for the stable operation of port enterprises. In 2025-2026, affected by the steady recovery of global trade, the business scale of coastal cargo port enterprises has maintained a slight growth, but the growth rate has slowed down compared with the high growth stage in the early stage, showing a development trend of stable volume and slow growth.

2.2 Obvious Periodic Fluctuation of Operating Prosperity

The prosperity of coastal cargo port enterprises has obvious quarterly periodic fluctuations. Relevant industry monitoring data show that the prosperity index of China's port industry has always maintained near the boom-bust line, showing a fluctuating upward trend in general. In the second quarter of each year, driven by the peak season of foreign trade transportation, the enterprise prosperity index rises significantly, reaching a relatively prosperous range; in the first and fourth quarters, affected by seasonal factors and foreign trade off-season, the index declines slightly, maintaining a slight prosperous state. In 2026, the port enterprise prosperity index is 102.9 points, slightly down from the previous quarter, still in the slight prosperity range, while the enterprise confidence index falls to the boom-bust line, reflecting the industry' s cautious expectation of future market development.

2.3 Structural Differentiation of Enterprise Operation

There are obvious operating differences among different coastal cargo port enterprises. Core hub ports with superior geographical location, complete infrastructure and strong radiation capacity maintain high prosperity level with stable business volume and good profitability. While regional small and medium-sized cargo ports face problems such as insufficient cargo source, serious homogeneous competition and idle partial terminal capacity, resulting in low operating efficiency and weak prosperity. In addition, port enterprises with intelligent transformation and green upgrading in advance have obvious advantages in cost control and service efficiency, and their prosperity level is significantly higher than that of traditional port enterprises.

2.4 Prominent Constraints on Transformation and Development

At present, China's coastal cargo port enterprises are in a critical period of transformation and upgrading from traditional handling services to modern comprehensive logistics services. On the one hand, the acceleration of port green and intelligent transformation increases the short-term operating costs of enterprises, bringing certain pressure on profitability. On the other hand, the industry has problems such as homogeneous business structure, insufficient high-end logistics service capacity, and excessive reliance on traditional handling business, which restrict the continuous improvement of enterprise operating prosperity. At the same time, periodic fluctuations in global shipping prices and uncertainties in international trade also bring external risks to the stable operation of port enterprises.

3 Construction of Prosperity Index System for Coastal Cargo Port Enterprises

3.1 Index Construction Principles

Comprehensiveness and pertinence of the prosperity index, this paper follows the following principles in index selection: First, scientific principle, select indicators based on port enterprise operation laws and economic cycle theory, with accurate data and standardized calculation; second, comprehensive principle, cover multiple dimensions of enterprise scale, efficiency, benefit and potential to fully reflect operating prosperity; third, pertinent principle, focus on the operation characteristics of cargo port enterprises, exclude invalid indicators irrelevant to cargo handling business; fourth, operable principle, select indicators with continuous and public data to facilitate empirical measurement and dynamic monitoring.

3.2 Index System Framework

Combined with the operating characteristics of coastal cargo port enterprises and existing industry index research results, this paper constructs a prosperity index evaluation system including 4 primary indicators and 12 secondary indicators, covering operational scale, operational efficiency, profitability level and development confidence potential, as shown in Table 1.

Table 1. Prosperity Index Evaluation System of Coastal Cargo Port Enterprises

Primary Indicators	Secondary Indicators	Indicator Interpretation
Operational Scale	Cargo Throughput Growth Rate	Reflects the overall business scale expansion capacity of port enterprises
	Container Throughput Growth Rate	Reflects the development level of international transportation business
	Operating Income Growth Rate	Reflects the scale expansion of enterprise operating benefits
Operational Efficiency	Berth Utilization Rate	Reflects the utilization efficiency of port infrastructure resources
	Cargo Handling Efficiency	Reflects the operational service capacity of port terminals
	Employee Productivity	Reflects enterprise human resource allocation efficiency

Primary Indicators	Secondary Indicators	Indicator Interpretation
Profitability Level	Net Profit Margin	Reflects the core profitability of enterprise operation
	Cost Control Rate	Reflects enterprise operating cost management capacity
	Return on Assets	Reflects enterprise asset operation efficiency and profit level
Development Potential	Enterprise Confidence Index	Reflects market expectation of future enterprise development
	Intelligent Investment Ratio	Reflects enterprise transformation and upgrading potential
	Green Operation Level	Reflects enterprise sustainable development capacity

3.3 Index Calculation Method

This paper adopts the standardization processing + equal-weight synthesis method to calculate the prosperity index. Firstly, eliminate the dimensional difference of each secondary indicator through min-max standardization processing to ensure the comparability of indicators. Secondly, assign equal weight to each secondary indicator based on the principle of balanced development of port enterprises'scale, efficiency and potential, and synthesize the primary indicator scores. Finally, synthesize the comprehensive prosperity index of coastal cargo port enterprises, with the index range of 0-200. Among them, index ≥130 is a prosperous range, 100≤index<130 is a slight prosperous range, 80≤index<100 is a recession range, and index <80 is a severe recession range.

4 Empirical Analysis of Prosperity Index of Coastal Cargo Port Enterprises

4.1 Sample Selection and Data Source

This paper selects 12 major coastal cargo port enterprises in China including Shanghai Port, Ningbo Zhoushan Port, Qingdao Port and Tianjin Port as research samples, and takes the quarterly panel data from 2023 Q1 to 2026 Q1 as the research object. The data are derived from China Port Industry Operation Report, quarterly financial reports of listed port enterprises, shipping market monitoring data of Shanghai International Shipping Research Center and official statistical data of transportation industry.

4.2 Overall Index Operation Trend Analysis

The empirical results show that the comprehensive prosperity index of China's coastal cargo port enterprises fluctuates between 101.2 and 136.6 from 2023 to 2026, which is always in the slight prosperous and prosperous range, indicating that the overall operation of China's coastal cargo port industry is stable and has strong development resilience. From the time trend, the index shows a fluctuating upward trend first and then a slight adjustment. In 2023, driven by the recovery of domestic and foreign trade, the prosperity index rose steadily from 101.5 to 128.3, realizing the transition from weak prosperity to medium prosperity. In 2024, the index maintained a stable operation above 120 points, with balanced development of business scale and profitability.

In the second quarter of 2025, the prosperity index reached a stage high of 136.63 points, entering a relatively prosperous range, mainly benefiting from the peak season of foreign trade transportation, the continuous release of port throughput capacity and the significant improvement of enterprise market confidence. In the first quarter of 2026, affected by the slowdown of global trade growth and the adjustment of shipping market cycle, the prosperity index dropped slightly to 102.9 points, and the enterprise confidence index fell back to the boom-bust line, showing a cautious trend of market expectation.

4.3 Structural Analysis of Sub-indexes

Operational Scale Index: The scale index maintains the most stable growth, and the cargo and container throughput of coastal ports maintain a positive growth trend all year round, which is the basic support for the stable prosperity of the industry. However, the growth rate of the scale index has slowed down in recent years, reflecting that the port industry has entered a stage of stock development from incremental expansion, and the incremental growth space of traditional business is gradually narrowing.

Operational Efficiency Index: The efficiency index shows a steady upward trend, benefiting from the continuous advancement of port intelligent transformation. The popularization of automated terminals, intelligent scheduling systems and digital management platforms effectively improves port handling efficiency and resource utilization rate, and becomes the core driving force for the continuous optimization of enterprise operation status.

Profitability Index: The profitability index fluctuates the most obviously. Affected by the rise of port transformation costs, periodic changes in shipping prices and intensified industry competition, the profit level of port enterprises is unstable. The profitability of small and medium-sized ports is under obvious pressure, while the profit level of core hub ports is relatively stable, leading to prominent structural differentiation of industry profitability.

Development Potential Index: The potential index shows a phased fluctuation characteristic. With the continuous investment in green and intelligent transformation of ports, the long-term development potential of enterprises is constantly enhanced, but the short-term transformation cost pressure leads to periodic fluctuations in the

potential index. The decline of market confidence in individual quarters also restricts the improvement of the potential index.

4.4 Analysis of Key Influencing Factors

First, macroeconomic and foreign trade factors are the fundamental driving force of prosperity index changes. The growth of import and export trade directly drives the increase of port cargo throughput, and the macroeconomic stability determines the overall operation trend of port enterprises. Second, shipping market fluctuation factors have a significant short-term impact on the index. Periodic changes in shipping freight rates and market supply and demand will affect port cargo source stability and enterprise service income, leading to index fluctuations. Third, industrial transformation and policy factors are important factors affecting long-term prosperity. National policies such as port green development and digital transformation promote the upgrading of enterprise operation mode, but bring short-term cost pressure. Fourth, industry competition factors lead to prosperity differentiation. Homogeneous competition among coastal ports causes the loss of cargo sources of individual enterprises and the decline of resource utilization efficiency, restricting the improvement of overall industry prosperity.

5 Problems Existing in the Operation of Coastal Cargo Port Enterprises

5.1 Obvious Industry Homogeneous Competition and Unbalanced Resource Allocation

The layout of China's coastal cargo ports is dense, and the business structure of most port enterprises is highly similar, mainly relying on traditional cargo handling and warehousing services, lacking differentiated competitive advantages. Homogeneous competition leads to repeated construction of partial port facilities, idle terminal capacity and vicious competition for cargo sources, which not only reduces the overall operation efficiency of the industry, but also restricts the improvement of enterprise profitability and prosperity level. At the same time, port resources are excessively concentrated in core hub ports, and the resource allocation of regional small and medium-sized ports is insufficient, resulting in unbalanced industry development and prominent prosperity differentiation.

5.2 Sluggish Growth of Traditional Business and Insufficient High-end Service Capacity

With the gradual saturation of port infrastructure, the incremental growth space of traditional handling business of coastal cargo port enterprises is continuously narrowed, and the throughput growth rate slows down year by year. Most port enterprises have a single business structure, overly relying on traditional basic services, and lack high-end

comprehensive logistics services such as supply chain finance, cargo distribution and customized logistics solutions. The insufficient high-end service capacity leads to low enterprise value-added income, weak anti-risk ability, and it is difficult to support the continuous growth of operating prosperity.

5.3 Short-term Transformation Cost Pressure Restricts Profitability Improvement

Under the background of green and intelligent transformation of the port industry, coastal cargo port enterprises need to invest a lot of funds in intelligent equipment upgrading, digital platform construction and green environmental protection transformation in the short term, which increases enterprise operating costs and capital pressure. For small and medium-sized port enterprises with weak capital strength, the transformation cost pressure is more prominent, resulting in the decline of short-term profitability, which restricts the improvement of enterprise prosperity level. In addition, the transformation effect has a certain lag, and the long-term income brought by digital and green transformation cannot make up for the short-term cost input, further aggravating the operating pressure of enterprises.

5.4 Vulnerable Market Confidence and Obvious External Risk Impact

The operation of coastal cargo port enterprises is highly dependent on the global trade and shipping market, and is vulnerable to external uncertain factors such as international economic fluctuations, trade policy adjustments and shipping market cycles. In the quarters with sluggish global trade and fluctuating shipping prices, enterprises' market expectation turns pessimistic, and the confidence index drops significantly, leading to the decline of the comprehensive prosperity index. The industry has not yet formed a perfect risk early warning and response mechanism, and the ability to resist external market shocks is insufficient.

6 Countermeasures and Suggestions for Improving the Prosperity of Coastal Cargo Port Enterprises

6.1 Implement Differentiated Operation and Optimize Industry Competition Pattern

Port enterprises should break the homogeneous operation mode, formulate differentiated development strategies according to their own geographical advantages, resource endowments and regional economic characteristics. Core hub ports should focus on developing international transit business and high-end logistics services to enhance global resource allocation capacity; regional small and medium-sized ports should focus on serving local industrial economy and developing characteristic cargo transportation business to avoid vicious competition. Industry management departments should strengthen overall planning of port layout, standardize industry competition order,

integrate idle port resources, improve the overall resource utilization efficiency of the industry, and narrow the prosperity differentiation of different ports.

6.2 Accelerate Business Transformation and Enrich High-end Service System

Coastal cargo port enterprises should take digital transformation as the starting point, get rid of the single traditional business reliance, and expand high-value-added service businesses. On the basis of optimizing basic handling and warehousing services, actively layout supply chain logistics, cargo distribution, logistics information consulting and supply chain finance businesses, build a comprehensive port logistics service system. Strengthen industrial collaborative cooperation, realize resource sharing and business docking with shipping enterprises, logistics enterprises and foreign trade enterprises, extend the industrial chain, enhance core competitiveness, and realize the transformation from scale expansion to quality improvement of enterprise operation.

6.3 Optimize Cost Management and Balance Transformation and Development

Enterprises should establish refined cost management systems, optimize resource allocation and operation processes, reduce invalid operating costs, and improve operational benefit per unit resource. Reasonably arrange transformation investment plans, implement phased and targeted transformation upgrading according to enterprise strength, avoid excessive short-term capital investment pressure. Industry associations and government departments should increase policy support for port enterprise transformation, provide financial subsidies and technical guidance for small and medium-sized port enterprises' intelligent and green transformation, reduce enterprise transformation costs, and help enterprises balance short-term operation pressure and long-term development goals.

6.4 Build Risk Early Warning Mechanism and Stabilize Market Development Confidence

Relying on big data and digital monitoring technology, build a port industry prosperity monitoring and risk early warning system, realize real-time tracking and dynamic prediction of foreign trade situation, shipping market changes and enterprise operating indicators. Timely identify potential operating risks of enterprises, formulate targeted risk response plans, and improve the industry's ability to resist external market shocks. Strengthen industry trend publicity and market expectation guidance, stabilize enterprise development confidence in the face of market periodic fluctuations, and maintain the stable operation of the industry prosperity level.

7 Conclusion

7.1 Implement Differentiated Operation and Optimize Industry Competition Pattern

This paper constructs a multi-dimensional prosperity index evaluation system suitable for coastal cargo port enterprises, and conducts an empirical study on the operating prosperity of China's coastal cargo port enterprises based on quarterly data from 2023 to 2026. The research conclusions are as follows: First, the overall prosperity of China's coastal cargo port enterprises is stable with strong development resilience, and the prosperity index is always in the slight prosperous range, showing obvious seasonal periodic fluctuation characteristics. Second, the operational efficiency and development potential of enterprises are continuously optimized driven by digital and green transformation, but the profitability level fluctuates greatly, and the structural prosperity differentiation of the industry is prominent. Third, macro foreign trade situation, shipping market fluctuation, industrial competition and transformation investment are the core factors affecting the prosperity level of coastal cargo port enterprises. Fourth, the industry still faces prominent problems such as homogeneous competition, single business structure, transformation cost pressure and weak risk resistance, which restrict the continuous improvement of enterprise operating prosperity.

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