Comprehensive Evaluation and Analysis of Maritime Soft Power Based on the Entropy Weight Method (EWM)

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Abstract: For one thing, maritime transport has expanded the scope and scale of human activities unprecedentedly. For another thing, it has promoted foreign exchanges between countries, it has played a huge role in the formation of the world pattern and the development of globalization, and has promoted the realization of a powerful transportation country. By constructing a maritime soft power evaluation model, we analyze the gap of maritime soft power between China and powerful transportation countries. It is mainly reflected in that marine insurance (including P&I insurance), shipping finance, shipping brokerage and other maritime service industries are still underdeveloped, the right to speak in the formulation of international shipping laws and regulations is still weak and China has not yet become an international maritime dispute resolution center. To enhance the soft power of maritime transport and assist the construction of powerful transportation country, we should further grasp more international discourse rights of shipping rules, actively participate in international maritime transport, improve the maritime legal system, cultivate high-quality maritime talents, and promote Chinese maritime culture.

1. Preface
The report of the 19th National Congress of the Communist Party of China put forward the construction of a powerful transportation country in the strategic deployment of building a modern economic system. This is a strategic arrangement made by the Party Central Committee with Comrade Xi Jinping as the core, standing at the overall level of the development of the party and the state. The historical mission of the industry has great practical significance and far-reaching historical significance. Looking at the rise of ancient and modern big countries and the road to national rejuvenation, many country are based on the development and prosperity of transportation and are marked by strong comprehensive national strength. Transportation, especially shipping, plays a pivotal role in the rise of the great powers like The Great Tang Dynasty with the Maritime Silk Road, the Netherlands with Sea Carriage, and the United Kingdom. On the one hand, the maritime transport has expanded the scope and scale of human activities unprecedentedly. On the other hand, it has promoted foreign exchanges between countries, and has played a huge role in the formation of the world pattern and the development of globalization, and has promoted the realization of a powerful transportation country. By constructing the evaluation model of maritime soft power and analyzing the gap of maritime soft power among countries, this paper puts forward relevant suggestions to improve the soft power of maritime transport and lay a good foundation for realizing the transportation power.
2. Marine soft power evaluation model and empirical analysis

2.1 Construction of evaluation indicators

During the Twelfth Five-Year Plan period, China’s maritime power-building strategy has taken solid steps. At present, China’s coastal port throughput and container throughput continue to rank first in the world. The volume of foreign trade cargo of coastal ports is 3.59 billion tons, accounting for more than 1/3 of the global total. The shipping fleet has a capacity of 230 million DWT and ranks third in the world. It effectively serves and supports China's status as the world's largest cargo trading country. However, the main reason for the gap between the world's recognized maritime powerful countries and China is that the development level of China's maritime soft power lags behind the development level of hard power.

The soft power of shipping is a country that has a huge and far-reaching influence on the world shipping methods and codes of conduct. In addition to improving the level of hard power, this kind of influence is more related to the development of China's international shipping standards, the maritime legal arbitration, and the maritime financial insurance and other high-end shipping services. To date, London is still recognized as the world's number one shipping center, and its strong soft power is the competitiveness of London's shipping. It has developed ship financing, shipping brokerage, insurance, maritime litigation and arbitration, and perfect maritime law. These elements support each other and promote each other, maintaining London's primacy in the maritime industry. Compared with London, our key is the gap in maritime soft power. This is mainly reflected in the fact that maritime services such as marine insurance (including P&I insurance), shipping finance and shipping brokerage are not developed enough, and in formulating international shipping laws and regulations, the right to speak is still weak, and China has not yet become an international maritime dispute resolution center.

The indicator system includes two first-level indicators and eight second-level indicators. Among them, the first-level indicators mainly represent the inherent law of maritime soft power from the two dimensions of shipping service and discourse power; the second-level indicators are the specific development based on functional attributes to the first-level indicators.

| First-level indicators | Second-level indicators | Comment content |
|------------------------|-------------------------|----------------|
| Shipping service       | Shipping brokerage service | Number of world famous shipping brokers, number of headquarters |
|                        | Maritime litigation and arbitration service | International Arbitration Sub-committee, the number of cases and the amount involved |
|                        | Shipping insurance service | The number of shipping insurance companies and the amount of insurance accounted for the world |
|                        | Shipping financial service | Shipping loan and financial leasing business |
|                        | International shipping center | Ship flow, information flow and capital flow agglomeration scale of international shipping in the world, the shipping center ranking based on relevant organizations |
| Discourse power        | Role in major international shipping organizations | The number of major organizations in the local place, Secretary-General and core senior positions, number of proposals, adoption and implementation time |
|                        | Marineservice innovation | Global monopoly, high barrier service, government service innovation promotion and enterprise maritime service innovation leading, partner acceptance willingness |
|                        | Green development level, technical | Emission control area scope and control standards, technical standards development capabilities, |
2.2 How to use the evaluation indicators

At present, there are many comprehensive evaluation methods involved in domestic and foreign literatures. According to different methods of weighting each index, it can be divided into objective evaluation comprehensive evaluation method and subjective weight comprehensive evaluation method. Among them, the objective evaluation comprehensive evaluation method mainly includes principal component analysis method, factor analysis method, entropy weight method, gray correlation method, etc. The subjective weight comprehensive evaluation method mainly includes expert scoring method, Delphi method, and analytic hierarchy method. In this study, the expert scoring method was used to score the second-level indicators of the evaluation index system of the maritime power, and then the comprehensive score was calculated by the entropy method.

1. Expert scoring method

The expert scoring method is also a qualitative description quantification method. The expert scoring method first selects several evaluation items according to the specific requirements of the evaluation object, and then formulates evaluation criteria according to the evaluation items, and employs a number of representative experts to rely on their own experience to score for each item and then combine them.

2. Entropy weight method

Entropy was first introduced into the information theory by Shannon, and has been widely used in engineering, social and economic fields. The basic idea of the entropy weight method is to determine the objective weight according to the magnitude of the index variability. Generally speaking, if the information entropy of an indicator $E_i$ is smaller, it indicates that the index is more variability, and the more information is provided, the greater the role that can be played in the comprehensive evaluation, and the greater the weight. On the contrary, the greater the information entropy of an indicator $E_i$, the smaller the degree of variability of the indicator, and the less information it provides, the smaller the role played in the comprehensive evaluation, and the smaller the weight.

The empowerment steps of the entropy weight method:

1. Data standardization

The data of each indicator should be standardized. Suppose there are $K$ indicators $X_1, X_2, \ldots, X_k$, among them, $X_i = \{x_{i1}, x_{i2}, \ldots, x_{in}\}$, Suppose after data standardization, the indicators are $Y_1, Y_2, \ldots, Y_k$, then $Y_{ij} = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})}$.

2. Find the information entropy of each indicator

According to the definition of information entropy in information theory, the information entropy of a set of data is $E_i = -\ln(n)^{-1} \sum_{i=1}^{n} p_{ij} \ln p_{ij}$. And $p_{ij} = \frac{Y_{ij}}{\sum_{i=1}^{n} Y_{ij}}$, if $p_{ij} = 0$, then $\lim_{p_{ij} \to 0} p_{ij} \ln p_{ij} = 0$.

3. Determine the weight of each indicator

According to the calculation formula of information entropy, the information entropy of each index is calculated as $E_1, E_2, \ldots, E_k$. Calculate the weight of each indicator by information entropy: $W_i = \frac{1-E_i}{k-\sum E_i}$ ($i = 1, 2, \ldots, k$).

2.3 Evaluation results
The maritime soft power evaluation index system, based on the available quantitative statistics, was evaluated through expert evaluation. Combined with the understanding of maritime powers and maritime development trends, it is further improved through expert consultation and evaluation. The results are as follows:

| Book2. The results | Score  | Rank |
|--------------------|--------|------|
| The United States  | 0.6342 | 2    |
| European Union     | 0.7676 | 1    |
| Japan              | 0.4943 | 3    |
| China              | 0.0706 | 4    |

3. The gap lies in the soft power of shipping

3.1 The maritime service industry is not developed enough

1. Shipping brokers:

   The quantity and quality of shipbrokers is considered one of the hallmarks of international shipping centres. One of the reasons why London is able to maintain its position as an international shipping center after the deterioration of its port function is to gather world-class ship brokers. Compared with shipping advanced countries (regions), there is a big gap in the number and quality of employees and transaction amount in China.

   The ship brokerage industry of major international shipping centers such as London and Hong Kong has formed a good market atmosphere and business rules. Even if there are no regulations and regulatory agencies specifically for the ship brokerage industry, there are clear trading rules and guidelines. Many of the world's leading ship trading agencies, represented by CLARKSON, are members of the Baltic Shipping Exchange. Members of the exchange must abide by the Baltic guidelines. The Code sets strict standards for the ethical nature of market conduct. Any brokerage company's brokers who violate this Code will be subject to strict penalties, including termination of membership of the Baltic Shipping Exchange or expulsion from their company. The Baltic Shipping Exchange's credo is Our Word Our Bondand requires managers to keep a detailed record of each transaction, regardless of whether the transaction is successful or not.

   At present, the domestic industrial and commercial administration department does not have the registration category of ship brokers. Therefore, practitioners often engage in this business in the form of edge ball. The level of behavioral norms and professional ethics of employees only depend on personal ethics. There are no rules or regulations or industry codes to regulate the professional behavior of employees. A good, orderly and self-regulating market atmosphere has not yet formed.

2. Shipping Finance:

   Shipping finance plays an important role in the international financial market and has an important impact on the development of the international shipping market. Compared with other leading shipping centers in the world, the shipping service function in Shanghai is quite different. Especially in shipping finance, shipping brokerage, shipping insurance, maritime arbitration, shipping information consulting services, etc., the high-end shipping service industry is still underdeveloped and has low internationalization.

   At present, the international shipping finance market share is dominated by several international shipping center cities. According to relevant information, London controls 18% of the global ship financing market, 50% of the tanker leasing business, and 40% of the bulk leasing business. In the field of shipping insurance, the United Kingdom, Japan, Germany, the United States and other countries control 60% share of global marine insurance, while London has a 23% share of the shipping insurance market. China's shipping service industry has little involvement in related fields, and the
global market share of various related businesses is basically less than 1%. The development of China's shipping service industry is facing problems like the lag of the development of high value-added maritime service industry, the climate and environment for the development of maritime service industry clusters have not yet formed, some existing shipping service categories have many enterprises, small scale, and non-standard services and there is a shortage of professionals in shipping services.

In recent years, the global shipping industry has entered a new round of adjustment period, and the world shipping center has moved eastward, which has brought opportunities for the development of China's shipping finance industry. On the one hand, the traditional shipping finance industry is mainly based on ship financing. As China's shipping industry moves more toward the deep sea, the main body of shipping finance have increased from shippers to shipping companies and financial institutions, and the format has also expanded from ship financing to online payment, shipping insurance, supply chain finance, etc. On the other hand, China is now the world's largest ship insurance market and the world's second largest cargo insurance market. Shanghai will also pilot various types of insurance institutions to carry out insurance in the region with innovations in shipping insurance products such as sea terminal liability insurance, oil pollution liability insurance, new transporter liability insurance, NVOCC liability insurance, and warehouse liability insurance. Ortiz Silas, Dean of the School of Shipping Business at Hamburg Business School, uses detailed data to analyze the current status of shipping finance, pointing out that Asia, especially Chinese financial institutions, have great potential in the development of shipping finance, or will become the largest shipping finance trend leader.

3. Shipping insurance:

There are three modes in the development of the shipping insurance industry worldwide: London's global network, its significant influence on world shipping and comprehensive services to develop shipping insurance model; Free ports, low tax rate, offshore development of shipping insurance model in Hong Kong and Singapore; strong international financial platform and free market development of shipping insurance model in the United States.

China's shipping insurance market is mainly concentrated in cargo insurance with lower market access. Some companies use low-rate malicious competition. Once they are out of danger, they often form a high loss ratio, which makes the business impossible. This situation makes it difficult for domestic and foreign insurers to continue to underwrite the business, resulting in the international insurance industry’s discrimination for this category in China. The insurer’s rate discrimination is also a serious obstacle to the enthusiasm of shipping insurance innovation. In addition, the shipping insurance tax rate is high, which affects the competitiveness of various insurance companies in the international insurance market. For example, Singapore is exempt from income tax on ship insurance and water insurance liability insurance, and there are generally no restrictions on foreign pre-tax deductions. These are not conducive to the sound development of China's shipping insurance market.

3.2 The right to speak in international shipping laws and regulations is weak

The countries build a maritime power country, the right to speak of the country is an important aspect of soft power. For a long time, developed countries in Europe and the United States have always dominated the formulation of the rules of the game in the shipping industry. It is difficult to hear the voices from developing countries in the formulation of international shipping standards and rules.

As a high-end industry for shipping legal services, international maritime arbitration has always been a symbol of maritime soft power. World seaborne trade disputes are mostly solved by maritime arbitration, and maritime arbitration is one of the trumps of European and American maritime transport. The integrity and development of British law in shipping law and the fact that British legal talents are neat and even oversupply have made London a place to provide international legal services, including arbitration. Singapore and Hong Kong are actively striving for a share with the help of their judicial system, language and talents. Therefore, 80% of the world's maritime litigation and arbitration are done in London, and the remaining 20% is completed in Hong Kong or Singapore. With the development of China's foreign trade and shipping industry, in recent years, there have been more and
more maritime disputes involving Chinese companies. However, in maritime dispute arbitration, Chinese companies have frequently lost their claims. In the case of shipbuilding contract disputes, the loss rate is as high as 90%. On one hand it is because Chinese companies are not familiar enough with the rules of international maritime games. On the other hand, it also reflects that China's right to speaking international maritime arbitration is still insufficient. From the current point of view, whether it is the legal environment, arbitration procedures, talent teams or institutional mechanisms, we still have a certain gap from the world's advanced level.

4. Suggestions for action

4.1 Focus on the construction of soft power in shipping, and further grasp the international voice of shipping rules.
Actively participate in the formulation of international shipping laws and regulations, enhance our international maritime discourse rights; actively participate in the formulation of international arbitration rules, establish cooperation mechanisms with advanced foreign arbitration institutions and international organizations, and learn from advanced international experience while also spreading China's maritime culture, further promotes the international influence and discourse power of China's maritime arbitration. At the same time, to improve the international competitiveness of China's maritime arbitration institutions, we should also take the enterprise as the main body, implement market-oriented operations, continuously innovate the institutional mechanism of arbitration services, and shape the image of the leading international arbitration institutions. Efforts will be made to establish a good image of China's maritime justice and maritime arbitration, train a high-level team of maritime lawyers, judges and arbitrators, and build China into an international maritime judicial center with high international influence and an international maritime arbitration center. Actively support the growth and development of maritime services such as shipping brokerage, marine insurance, maritime consulting, shipping technology services and marine inspection and public assessment.

4.2 Actively participate in international maritime governance.
We should deepen the opening up of the maritime investment sector and do a good job of copying and promoting the maritime innovation policy in the Pilot Free Trade Zone. Continue to promote the reform of shipping in an orderly manner and create a good development environment. Support maritime enterprises to implement the going out strategy, build an international industrial layout and service network, strengthen international port operators, and further enhance the global maritime resource sharing level and configuration capabilities. Actively participate in the management of important international channels and contribute to international anti-piracy and important international waterway infrastructure construction. Give full play to China's comprehensive advantages in shipping and provide assistance for personnel training and technical equipment support for maritime construction in developing countries. Establish regional shipping organizations to gather and integrate Asian shipping voices. Promote the application of the Beidou navigation system in the international maritime field.

4.3 Improve the maritime legal system.
Adjust the tax policy for international shipping. Refer to the practice of major shipping countries in the world, study and explore the establishment of China's international shipping tonnage tax system for the international shipping industry; improve the maritime market supervision and anti-monopoly mechanism, give full play to the industry advantages of the transportation industry authorities and the statutory duties of anti-monopoly law enforcement agencies, and form a linkage Mechanism. According to China's maritime development needs and international maritime development trends, we should promote the revision of maritime related laws and regulations such as the Maritime Traffic Safety Law and the Maritime Business Law, and improve the relevant supporting laws and regulations of the Port Law and the Waterway Law.
4.4 Cultivate high-quality maritime talents. 
Cultivate a team of marine entrepreneurs, professional management and technical talents with international vision, familiarity with the laws of the maritime market and technological development, and open up channels for talent mobility so that talents can flow between the government and the market, technology and management. Make good use of the existing international bilateral and multilateral maritime governance system, improve the normalization work system of IMO affairs management, and recommend high-level talents in China to enter into the top level of IMO.

4.5 Promote Chinese maritime culture.
In the maritime cultural propaganda, let hundreds of millions of people gain more sense of sharing marine development achievements. First, strive to upgrade China's sailing day activities and announcement levels from provincial to ministerial level. The Nautical Day announcement strengthens the dual role of shipping in national security, and economic development. Encourage to support in the production of various types of marine film and television cultural works. Prepare the History of China's Water carriage, sum up and promote the achievements and spirit of water carriage in China.

As the traffic backbone of the maritime industry, the improvement of the soft power of the maritime industry will complement the formulation of the system of transportation power, the cultivation of talents and the deepening of culture. Therefore, it is in line with the national policy orientation, guarantees the sustainable and healthy development of maritime transport, and promotes the smooth transition of China from a large transportation country to a powerful transportation country.

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