A cross-country study of competitiveness of the shipping industry

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ABSTRACT

For the last 50 years, international trade has been increased in both volume and speed, which has in turn brought about ever-increasing competition among major maritime nations and required a corresponding shipping policy. This study is to identify and weight the factors influencing a country's shipping competitiveness and shipping policy. According to the results of questionnaires and Delphi method, 24 factors have been chosen from a practical perspective while weights of factors are determined by the application of analytic hierarchy process (AHP) from a theoretical perspective. Then, on the basis of factors and their weights, a shipping competitiveness index (SCI) is constructed to quantitatively measure and rank the main maritime countries. In addition, the results of cluster analysis, based on each country's present and potential competitiveness, provide some implications and policy suggestion for each group of nations with similar background and development conditions.

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1. Introduction

The shipping industry, generally considered a basic industry, plays a guiding role in a country's economic development. First, it is derived from international trade and undertakes the transportation of goods around the world and many necessary inputs of production rely on imports of raw material and energy transported via shipping. According to the International Maritime Organisation (IMO) (2008), over 90% of the global trade volume was carried by sea and maritime transport was regarded as a dominant mode of transport. Second, with the globalization of production, shipping has a tremendous impact on global supply chain management reflected by the world's total container ship dead-weight tonnage (De Langen and Visser, 2005; Yang et al. 2013). Then, operational performances of multinational corporations and even a country's foreign trade and national economy will be influenced by shipping (Fagerberg, 1995; Kwak et al., 2005). Third, other industries will benefit from the shipping industry due to its fine infrastructure and service systems. For example, the shipping-related services, such as ship finance, shipping insurance and shipping derivatives, have made more and more important contributions to the finance industry. In addition, it is also a service industry that can provide abundant employment opportunities (Tsamourgelis, 2007; Fock, 2008).

With consideration of its importance for a prosperous economy, the government tends to provide financial and policy supports for the shipping industry in order to improve the shipping environment and gain shipping competitiveness. Actually, some countries have changed their disadvantageous positions and caught up with traditional maritime countries by intensive state investment in port development, shipbuilding industry and related shipping services. Thus, the shipbuilding industry has experienced tremendous changes within the global market during the period of 2000 to 2010. With Europe's domination fading away, its leading position was challenged by Japan, South Korea and China thanks to their positive policies and economic booms (Li et al., 2012).

Consequently, the issue of identifying and quantitatively measuring factors influencing competitiveness of the shipping industry has drawn considerable attention of academicians, practitioners and policymakers, which is reflected by a large number of papers written in this area. A detailed literature review will be presented in Section 2. By undertaking a thorough investigation into the earlier research, it can be clearly seen that most studies have been conducted on a particular area of the shipping industry, such as port advantages, shipbuilding business and short sea shipping. However, only relatively few articles have considered a comprehensive evaluation of a country's shipping competitiveness. Therefore, this paper proposes a comprehensive evaluation framework for competitiveness analysis of the shipping industry by taking account of a country's present and potential shipping competitiveness.

The work herein contributes to the existing literature in at least two important ways. On one hand, the competitiveness of a country's shipping industry depends not only on its present shipping strength but also on its potential shipping advantage.

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According to the results of questionnaires and Delphi method, 24 main factors influencing present and potential competitiveness of the shipping industry are chosen from a practical perspective while weights of influence factors are determined from a theoretical perspective. In other words, weights are determined by the application of analytic hierarchy process (AHP). Then, on the basis of influence factors and their weights, we construct a shipping competitiveness index (SCI) to quantitatively measure the maritime strength of sample countries. On the other hand, considering the results of cluster analysis, a country can identify another similar country and draw lessons from its outstanding experience to accelerate domestic shipping industry development. The methodology and empirical results presented in this study might shed some light on the government's shipping policy making.

The remainder of this paper is organized as follows: Section 2 discusses the previous literature on the identification of shipping competitiveness. Section 3 presents the methodology employed to identify and weight factors influencing the competitiveness of a country's shipping industry. Some descriptions of data and empirical results are analyzed and reported in Section 4. Section 5 provides some implications and conclusions.

2. Literature review

The literature on the issue of competitiveness is extensive. Among them, an influential and classical approach is the diamond model developed by Porter (1990). In his model, all factors influencing the competitiveness were classified into interrelated components and exogenous parameters. The former included factor conditions, demand conditions, related and supporting industries, firm strategy-structure and rivalry while the latter included government and chance. Afterwards, the diamond model was expanded by other scholars. For example, Dunning (1992) treated multinational activity as a third exogenous parameter which should be added to Porter's model. The double diamond model, as an extension of Porter's original diamond model, was developed by Rugman and D'Cruz (1993) where both domestic and foreign diamonds were considered. Although some weaknesses existed in Porter's diamond model, it was taken as a key tool for the analysis of competitiveness and applied in many areas (see, Fahy, 2002; Nishaal and Guntur, 2005; Berger, 2008). The most important reason was that it provided many feasible guidances in identifying factors influencing the competitiveness of countries, industries and firms from a systematic and comprehensive perspective (see Zanakis and Becerra-Fernandez, 2005; Zhao et al., 2011; Ajitabh and Momaya, 2004).

This guidance is also employed to identify influence factors of competitiveness of a country's shipping industry. Due to the syntheses and complexities existing in the shipping industry, the previous literature mainly concentrates on particular areas, such as port development, shipbuilding business and short sea shipping. To begin with, port competitiveness is one of the most prominent issues drawing considerable attention in the literature. What is more, with consideration of the growing world trade, many maritime countries have been motivated to carry out large-scale port development in order to improve their infrastructure, expand facilities and improve services, which creates ever-increasing competition between ports. A large number of studies pertaining to port competitiveness during the period from 1980 to 2005 were reviewed by Yeo et al. (2008) where authors argued that the previous studies mainly concentrated on port selection criteria. By face-to-face and telephone interviews, 38 components, such as availability of vessel berth on arrival in port, cargo proportion of transhipment cargo, cost for cargo handling, transfer and storage, and so on, were selected for evaluating port competitiveness.

Different perspectives of analyzing the competitiveness of port were put forward in some recent researches. For example, from the perspective of port operations, Acosta et al. (2011) provided an exploratory analysis of the factors that determined the competitiveness of fuel supply at the ports of the Gibraltar Strait. By interviews and questionnaire, 20 factors including fuel price, geographical advantage, anchoring and docking availability, simplicity/accessibility to port, port tariffs, etc., were identified by them to analyze bunkering competitiveness. According to their result, fuel prices and geographical advantage were the two main factors influencing shipping company choice of bunkering port. On the other hand, from the users' perspective, Yuen et al. (2012) investigated both the factors and their relative importance weights in determining a port's competitiveness via the AHP method. Their analysis was conducted from the following eight aspects: port location, costs at port, port facility, shipping services, terminal operators, port information systems, hinterland connections, customs and government regulation. Moreover, they pointed out that "costs at port" was the most important factor for shipping lines while "port location" was the most important factor for both forwarders and shippers. In addition, Yeo (2010) provided evidence that factors, such as operating capacity, convenient facilities, electronic documents handing capacity and connectivity to hinterland, had a non-negligible role as to the competitiveness of sample Asian container terminals. A comparative study on container port systems in China and the USA was carried out by Li et al. (2012) where port throughput, number of container ports and the concentration level were considered as the main factors influencing the evolution of container port systems. Other studies, such as Holmes and Schmitz (2001), Pallis and Vaggelas (2005), Song and Yeo (2004), Huang et al. (2003), Tongzon and Heng (2005), Song and Panayides (2008), and so on, are also related to the identification of port competitiveness.

Second, generally speaking, the shipbuilding market is the fundamental source of transport capacity. According to King (1999), the competitiveness of shipbuilding industry was of importance in the economic development and national security for ocean nations or areas. The ECORYS Research and Consultancy (2009) presented a schematic framework for a competitiveness analysis of European shipbuilding and marine equipment sector where industry structure, regulatory framework and competitive environment were considered as three main blocks affecting the competitiveness performance of the European Union shipbuilding industry. Chou and Chang (2004) showed that four categories of resources controlled by shipbuilding firms had substantial influence on the competitiveness of shipbuilding industry. They were tangible assets, intangible assets, management capabilities and technology capabilities. A comparative analysis was carried out by Ionescu (2011) who investigated the competition on the global shipbuilding market under the global crisis impact. In a more recent study of Li et al. (2012), they examined the competitiveness of Asian shipbuilding policy and the industry with the introduction and application of AHP method. Following their study, the competitiveness of a country's shipbuilding industry could be demonstrated from eight aspects: cost, vessel, capacity, efficiency, shipyard, workforce, expertise and policy. Many other papers contribute to the competitiveness analysis of the shipbuilding industry, such as Gebhardt and Jarvis (2003), Zakaria et al. (2010), Hassink and Shin (2011), Pires et al. (2009), and so on.

Third, the competitiveness of short sea shipping (SSS) is another popular issue pertaining to shipping industry, which has been widely studied. Generally, it is taken as an alternative to road haulage due to its superiorities in reducing traffic congestion and greenhouse gases (Brooks and Frost, 2004). Taking the European Union (EU) as an example, almost 40% of domestic transportation of goods was done by sea, while 45.6% was done by road within