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Determinants of global logistics hub ports: Comparison of the port development policies of Taiwan, Korea, and Japan

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ABSTRACT

This paper explores global logistics hub port assessment criteria, and compares the competitiveness of three major international hub ports in Northeast Asia, namely the ports of Busan, Tokyo, and Kaohsiung, from a logistics perspective employing a hybrid multi-criteria decision-making approach incorporating the analytical hierarchy process (AHP) and gray relational analysis (GRA). A total of 20 assessment criteria are obtained under the five dimensions of political–economic environment, operating environment, cost environment, infrastructure facilities environment, and preferential incentive environment. The AHP results show that, from the perspective of all respondents, the top five assessment criteria are transport and distribution costs, convenience of customs clearance procedures, harbor and stevedoring costs, cost of land, and soundness of investment system and incentive measures. Based on GRA outcomes, Busan has the highest level of satisfaction as a global logistics hub port, followed by Tokyo and Kaohsiung.

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1. Introduction

The development of mega ships and emergence of mega strategic alliances in container shipping, including such alliances as 2M (Maersk and MSC), O3 (CMA CGM, China Shipping, UASC), G6 (NYK, Hapag-Lloyd, OOCL, APL, HMM and MOL), and CKYHE (COSCO, K-Line, Yang Ming, Hanjin and Evergreen), has changed vessel deployment patterns and port rotation schedules dramatically, and shipping companies are reducing operational costs and achieving the benefit of economies of scale by scheduling their mega ships to call at a small number of mega-hub and gateway ports. As a result, some existing hub ports on major trunk lines may be downgraded to regional ports serving only regional routes.

Driven by China's continuing economic growth and thriving deep water ports, major trunk lines have shifted from calling on international commercial ports throughout Northeast Asia to calling exclusively on ports in China over the past decade. This trend has threatened major container ports in the leading maritime nations of Northeast Asia, such as ports of Kaohsiung, Busan and Tokyo. Fig. 1 shows the performance of major ports in China and Northeast Asia between 2001 and 2013 (Informa, 2014). Shanghai and Shenzhen enjoyed the very high average annual growth rates of 39.12% and 32.60% owing to China's strong international trade growth. Busan and Tokyo had stable annual growth rates of 10.83% and 8.22%, while Kaohsiung had a very modest 2.31% growth rate. This data reveals that the Chinese ports have enjoyed much faster container throughput growth than the ports of Kaohsiung, Busan, and Tokyo. While the ports of Tokyo, Busan, and Kaohsiung were formerly major hubs in the region, their role is being challenged by China's emerging ports, and how to deal with the competitive pressure from China has thus become a critical issue for Japan, Korea, and Taiwan.

Responding to the aforementioned challenge, Taiwan, Korea and Japan have implemented a series of measures to strengthen their competiveness, including Taiwan's 2008 I-Taiwan 12 Construction Plan, Japan's 2006 Super Hub Port Establishment Program and 2010 International Strategic Port Plan, and Korea's 2003 Northeast Asian Logistics Hub Port Program. These programs have sought to enhance port logistics infrastructure through measures such as port expansion, establishment of free trade zones (FTZ), and improvement of hinterland transport networks; and also to improve inefficient and unreasonable port logistics processes through logistics information system integration and specialized logistics enterprise training.

This paper investigates the major factors affecting global logistics hub ports in Northeast Asia and provides suggestions for dealing with competition issues based on a comparative analysis of port policies in Taiwan, Japan, and Korea. Because the ports of Busan, Tokyo, and Kaohsiung are the leading ports in terms of container throughput in their respective countries, we therefore

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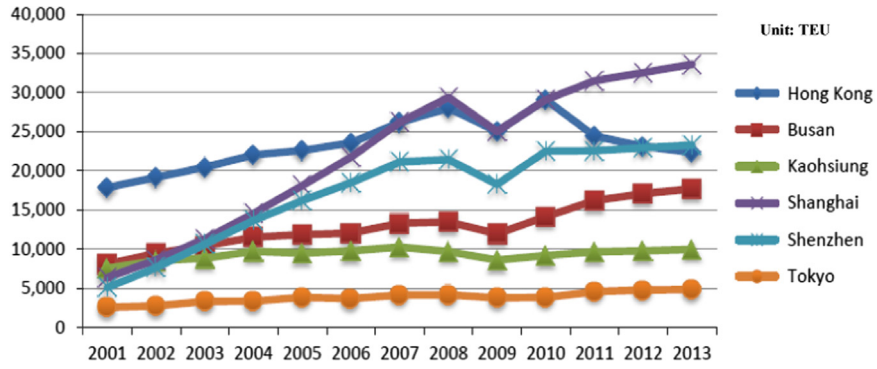

Fig. 1. Container volume of major mega hub ports in East and Northeast Asia, 2001–2013.
Source: Informa UK Ltd. 2014.

focus on these three ports, and neglect other ports in these countries. The objectives of this paper are as follows:

- To review the definitions and characteristics of global logistics hub ports.
- To determine assessment criteria for global logistics hub ports, and using these criteria to assess the competitiveness of the three mega-hub ports.
- To provide port strategy suggestions for governments and port administrators.

This study first reviewed literature concerning port choice criteria, gathered criteria frequently used in past research, and obtained industry experts' opinions concerning the criteria via interviews. A survey of key port users and port management companies was then performed to obtain validation. The collected data was analyzed using a hybrid multi-criteria decision-making approach incorporating the analytical hierarchy process (AHP) and gray relational analysis (GRA).

2. Literature review

This section reviews literature connected with hub port selection criteria and the characteristics of global logistics hub ports in order to determine assessment criteria for global hub ports. The section also reviews and compares existing global logistics hub policies in Taiwan, Japan, and Korea.

2.1. Global hub port assessment criteria

Numerous studies have addressed port selection criteria (e.g. Tongzon, 1995, 2007, 2009; Malchow and Kanafani, 2001; Notteboom, 2004; Ugboma et al., 2006; Yu et al., 2006; Chang et al., 2008; Wong et al., 2008; Wiegmans et al., 2008; Song and Panayides, 2008; Yeo et al., 2008; Chou H. S., 2010; Chou C. C., 2010; Onut et al., 2011; Tran, 2011; Tavaszy et al., 2011; Zhang et al., 2011; Musso et al., 2013; Ahn et al., 2014; Sayareh and Rezaee Alizmini, 2014). The following is a summary of the main port selection criteria found in the reviewed literature:

- Geographic strategic location/distance: port location; maritime distance and inland distance between origin and destination. Tongzon (2007) proposed that a strategic location is critical for a logistics hub, which implies that a logistics hub port should be located on a main international shipping route.
- Physical port infrastructure: capacity of port facilities such as berths, cargo handling capacity, harbor draft, and intermodal transport facilities.
- Hinterland criteria: the location of hinterlands, extent of hinterlands, inland infrastructure facilities, hinterland connectivity, hinterland economy, cargo sources, and the proximity to consumers.
- Maritime connectivity: frequency of shipping calls, overall global services, and port accessibility.
- Costs: port fees, cargo handling charges, inland transport costs, and logistics costs.
- Operational efficiency: working time, port turnaround time, cargo handling speed, etc.
- Service quality: reliability, cargo damage avoidance credibility, quick response to users' needs (agility), and port reputation.
- Security and safety.
- IT systems: port information services, system integration and innovation.
- Others aspects such as customs, immigration and quarantine related services.

A few studies have examined hub port competitiveness factors from an international logistics perspective. In addition to the aforementioned factors of strategic location and port infrastructure and service level, efficient hinterland systems and integration of port logistics functions are also considered key elements of a logistics hub port's competitiveness.

- Efficient hinterland systems: port service, hinterland conditions, availability, convenience, logistics costs, regional centers, and connectivity (Yeo et al., 2008). Yu et al. (2006) proposed that cargo sources are an essential factor; Zhang et al. (2011) argued that the port hinterland economy is a decisive condition for the development of port logistics, and has a direct positive correlation with the level of cargo flow.
- Port logistics integration: information and communication technology (ICT), relationships with shipping companies, value-added services, inland transport links, relationship with inland carriers, and channel integration practices and performance (Song and Panayides, 2008)

Ports are maritime logistics centers at the interface of land and sea, and provide logistics services meeting customers' needs. The transformation of a port into a logistics center requires space for logistics enterprises either within the port or adjacent to the port. The development of Free Trade Zones (FTZs) in the port hinterland is a common means of enhancing the ability of international container ports to provide value-added logistics services. As mentioned previously, Taiwan, Korea, and Japan have planned or are establishing FTZs within port hinterlands in order to promote their major container ports as regional logistics hubs and boost their national economies.

The presence of relevant business and logistics activities in a

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