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A Longitudinal Analysis of Concentration Developments for Container Terminals in Northern Vietnam

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ABSTRACT

Vietnam has been one of Asia's fastest growing economies since 1990, with a steady growth of 6-8 percent. Vietnam's container port throughput volume also increases impressively year by year, at around 6-8 percent since 2002. To cope with increasing cargo volume, the development of modernized container terminals in Northern Vietnam has intensified. This longitudinal study aims to identify the development of the system and, in particular, the concentration or deconcentration tendencies, as well as the geographical patterns from 2005 to 2014. In order to achieve the study's objectives, the Herfindahl–Hirschman Index (HHI), concentration ratios (CR1, CR3), the Gini coefficient, the Lorenz curve, and shift-share analysis (SSA) were applied based on container throughput volume data from 2005 to 2014. The results demonstrate that the development of container terminals in Northern Vietnam has experienced a deconcentration trend and considerable shifting among its terminals during the period of observation. The proposed and validated research is original as it is the first study of concentration, deconcentration, and geographical patterns for container terminals in Northern Vietnam. The findings will enable port authorities, policy makers, and port operators to understand the development and changes of container terminal systems in Northern Vietnam more clearly.

1. Introduction

In the 1960s, the development of the standardized box revolutionized maritime transport (Graham and Hughes, 1985). Containerization creates many advantages, such as ease of handling and safety, when compared to conventional bulk (Hsu, 2013). Additionally, ports and maritime transport have developed in line with the growth of international trade and the world economy (Mangan et al., 2008). The establishment of new ports, the decline of traditional ports, and the restructure of the port system is necessary in order to accommodate the new requirements of containerization, as well as global commerce (Notteboom, 1997). According to Lee et al. (2014), fierce port competition could be a cause

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for cargo shifting to rivals as a consequence of the tendency to deconcentrate. As a result, many studies have been conducted to examine the process of port system development using empirical cases (Taaffe et al., 1963; Hayuth, 1988; Slack, 1990; Kuby and Reid, 1992; Wang and Ducruet, 2012; Li et al., 2012; Liu et al., 2013; Pan et al., 2014). It is certain that the seaport system in Vietnam has experienced adjustments in order to adapt to global trends as evidenced by its rapid growth over the years.

Vietnam is one of Asia's fastest growing economies, with a steady gross domestic product growth of 6-8 percent since 1990 as a result of its integration into the world's economy (The World Bank, 2014). Vietnam has a comparative advantage in terms of geographical location with its long coastline of nearly 3,500 km facing the Pacific Ocean, which provides great benefits for a developing a seaport system capable of reaping the benefits from the most dynamic shipping service route connecting Europe and Asia. The container terminals' throughput volume in Vietnam increases impressively year by year, at around 6-8 percent since 2002 (The World Bank, 2014). Additionally, 2014 saw the highest growth over the years at 10.24 million TEU, a rise of 20.1% as compared to 2013 (Vinamarine, 2015).

Vietnam has a total of 44 seaports including 219 terminals with nearly 44 km berth length. The system is classified into six groups based on region and throughput. These are comprised of group 1: northern seaports from Quang Ninh to Ninh Binh; group 2: northern central seaports from Thanh Hoa to Ha Tinh; group 3: central seaports from Quang Binh to Quang Ngai; group 4: southern central seaports from Binh Dinh to Binh Thuan; Group 5: southeastern seaports; and group 6: Mekong Delta seaports, including the southeastern islands (Decision 1037/QD-TTg, 2014). According to 2014 World Bank statistics, over 90 percent of the country's total throughput is concentrated in two shipping centers, Ho Chi Minh City (group 5) and Hai Phong (group 1). Despite accounting for only about 30 percent of the total volume, the Northern seaports' performances have had a rapid growth rate. During 2000-2011, the northern region recorded a 24.5 percent growth in container throughput volume, while the southern region achieved a growth rate of 14.3 percent. The development of container terminals has been contributed to by numerous industrial complexes in Hanoi and by satellite areas in the region, as well as the increasing cross-border commercial activities with Southern China through the border gates of Mong Cai, Lang Son, and Lao Cai. The hinterland connections have strengthened the role of Northern Vietnam's seaports because of the comparative advantages arising from a wide range of infrastructures and facilities, such as logistics centers.

In Northern Vietnam, the competition among container terminals has resulted in deconcentration tendencies and shift share situations. However, related research on Vietnam seaports was conducted in exceedingly limited research areas, such as the development of seaport systems in Vietnam (Tran and Chapman, 2006) and the efficiency and competitiveness of container terminals in Northern Vietnam (Nguyen and Kim, 2015). There is also little research that analyzes the longitudinal analysis of concentration developments for container terminals in Northern Vietnam. Hence, this study provides empirical research that takes into account the longitudinal development of container terminals in Northern Vietnam from 2005 to 2014. The container throughput volume data is analyzed by concentration indicators, namely the concentration ratio (CR), the Herfindahl–Hirschman Index (HHI), the Gini coefficient, the Lorenz curve, and shift share analysis (SSA). The findings provide insights into the process of container terminal development and have academic and managerial implications.

The paper is structured to achieve its objectives as follows: section 2 reviews relevant literature about geographical issues, as well as the sequence of port system development; section 3 discusses the applied methodologies; section 4 presents and analyses the results in terms of the concentration ratio of the port system in Northern Vietnam; and section 5 and section 6 provide discussion and the conclusion, respectively.

2. Literature Review

In the literature, numerous studies relating to the geographical question of port system development have been performed. According to Ducruet et al. (2009), at least 34 studies on the evolution of port concentration tendency were conducted from 1963 to 2008. The foremost driving factors of development are the size of the hinterland, the strategic location of the ports, regional integration, and port competition. Of these papers, Taaffe et al. and Hayuth illustrated idealized models for the development of a seaport system (Notteboom, 1997).

According to Taaffe et al. (1963), there is "an ideal-typical sequence of transport development" seen in the empirical cases of port systems in Ghana and Nigeria that include six phases: penetration lines, concentration, development feeders, the beginnings of interconnection, complete interconnection, and the emergence of high-priority "main streets". The initial stage of development featured scattered ports along the seacoast with little connection. In the next stage, some ports emerged as major points in the network because of "the comparative locational advantages," such as proximity to mineral exploitation, agricultural export production, or an administrative center, as in the case of the African countries. As a result of the port concentration, the development of feeder routes, as well as inland centers, established main streets in the seaport network. Additionally, some smaller ports disappeared due to ineffective performance. In 1990, Slack added a seventh phase to Taaffe's model, the fully-developed intermodal system, in which the redundant ports of "high priority linkages" would be eliminated.

Another typical model of the container port system development was introduced by Hayuth in 1981 to adjust to the containerization and intermodal transport trend based on the study of the American container port system. The process was comprised of five phases that outlined the preconditions for change: initial container port development, diffusion, consolidated and port concentration, the load center, and the challenge of the peripheral ports. The trend in growing port concentration has been inevitable as some dominant container terminals have gained comparative advantages arising from their location and financial capacity. Moreover, the ports' extended hinterland and the reduction of the number of port calls of the container vessels contribute significantly to the trend. However, the development of the concentration trend would alter deconcentration, which is influenced by the result of "peripheral ports" since the diseconomies of scale, congestion, and certain problems of larger ports adversely affect the centralization of the container port system.

In 2005, Notteboom and Rodrigue added a new phase of port development, regionalization, which is the result of stronger connections with the hinterland, the transshipment ports, and the foreland. This final phase reduces the logistics cost by implementing information technology and intermodal transport.

However, many authors also argued that a common model for the development of the container terminal system was unfeasible because the process would vary according to the economics of the region (Wang, 1998). Various factors besides favorable location and hinterland, such as