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Transshipment hub selection from a shipper's and freight forwarder's perspective

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ABSTRACT

Transshipment hub selection becomes increasingly important to the global logistics community. From the perspectives of shippers and freight forwarders, a selection must align with cost control strategy and sustain service reliability across cooperative service providers. This paper assesses the selection with the options of both sea and air transports, and from the influence of country of origin of the company. Critical factors of transshipment hub selection, both qualitative and quantitative, are identified through focus group discussions. Relative importance of these factors is determined based on collective views of logistics stakeholders. The competitiveness of transshipment hubs is then assessed using an AHP approach. Our analysis is based on the historical implementation of direct transportation link policy between Mainland China and Taiwan. With this empirical work, the finding suggests that even the spawn of other nearby ports with shorter transport distance and closer proximity to cargo sources, there remain overriding factors such as customs regulations & government policies and connectivity that a transshipment hub is preferred.

1. Introduction

Thanks to economic globalization, products on the market are most likely coming from the other part of the world for improving profit margins and necessitating keen global logistics strategy (Van Hassel, Meersman, de Voorde, & Vanelslander, 2013). Global cargo logistics entails multiple logistics nodes and the cooperative planning of multiple logistics stakeholders (Carlan, Sys, & Vanelslander, 2016). The connectivity of these nodes, e.g., distribution centers, sea container ports, airports, and transshipment hubs, becomes crucial for effective shipment planning. In cases where global supply chains with high tonnage and volume, the selection of a transshipment hub over a cargo flow becomes increasingly important to cost control and service reliability in the daily operations of logistics stakeholders.

Currently the global logistics market has been witnessing the increasing use of transshipment transport (Jiang, Lee, Chew, Han, & Tan, 2012). An increasing number of ports emerge as transshipment hubs, and some only provide transshipment service (Baird, 2006; Meersman, de Voorde, & Vanelslander, 2016). Traditionally, a transshipment port may act as simple as passing freight between ships and landside transport. Recently, a transshipment hub could include container terminals, cross-docks, consolidation centers, and other facilities beyond seaports and airports (Vis & de Koster, 2003). Thus operating a transshipment hub becomes complicated (Petering & Murty, 2009), such as storage yard management. Furthermore, selecting a transshipment hub is neither trivial nor straightforward. The selection has to assess transshipment hubs within the context of regional or global logistics network. It has to concern more on the connectivity among multiple ports, rather than the operational effectiveness of a single port. It may also need to consider the cross-boundary issues involved.

Referring to existing literatures on port selection, when it comes to the selection of a transshipment hub, we believe there are three overarching concerns that one would consider. Firstly, logistics stakeholders could prefer different transshipment hubs in global logistics due to their different business role. Shippers and freight forwarders often select a transshipment hub based on strategic and operational concerns respectively. For instance, shippers could make their strategic chain choice based on spatial,

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value, and organizational driving forces (Shi & Li, 2016). Shippers could operationally select a transshipment hub to align the strategic requirement, when ports are choices in hubs with different governmental regulations and service quality and efficiency (Steven & Corsi, 2012; Talley & Ng, 2013). While from forwarders' perspective, the hub selection is the core to strategic route optimization, which could considerably affect on-time delivery, operational efficiency, and service quality in cargo handling and customs clearance (Chu, 2014; Lirn, Thanopoulou, Beynon, & Beresford, 2004; Nugroho, Whiteing, & de Jong, 2016; Tran, 2011).

Secondly, both sea and air transports should be options to be considered concurrently. The primary concern is the varying aspects of cargo flow. Nowadays, it is a common practice for logistics service providers and airlines to transport cargo from Asia via ocean to the Middle Eastern freight hub and then transfer to an aircraft for the second leg of the journey to Europe or Latin America (Kulisch, 2016). In Northern Canada, it has been witnessed that water conditions impact shippers' route choice decisions and the overall performance of multimodal freight transport systems (Du, Kim, & Zheng, 2017). Here an intermodal operator (e.g. shipper, carrier, or terminal operator) typically designs her service products by following dynamic allocation policies of resources (e.g. air and sea resources), and make her route choice based on the intermodal transportation network (Wang & Meng, 2017; Wang, Wang, & Zhang, 2017). Both the real-world practices and the relevant academic studies endorse that when selecting a transshipment hub, the services related to both sea and air transports should not be assessed in isolation.

Thirdly, a company's country of origin could be a concern in the stakeholder's shipping strategy influencing the choice of a port simply. The effect of country of origin has been extensively studied in strategic management and organizational behavior (Song, Calantone, & Anthony, 2002). Country of origin, when associated with products, could be regarded as synonymous of high quality and original design, influencing the value perceived by the customers (Insch & McBride, 2004). It could also be a critical factor affecting particular strategic decision making, such as supply chain configuration of the firms (Brun et al., 2008; Teng & Jaramillo, 2005). Other literatures have suggested that companies with different country of origin could have significant different emphasis in strategic decision making (Demirbag, Tatoglu, Glaister, & Zaim, 2010; Harzing & Sorge, 2003). Similarly, in our study, a company's decision makers are likely to have deeper understanding of the ports in the region where their company originally established and more concrete knowledge of their country's unique competitive edge as a selling point in the market. The inherited know-how could influence decision makers' preference in choosing a transshipment hub.

To explore causation of the above concerns on transshipment hub selection, we select the case about Hong Kong and Taiwan from the population of ports in Asia. It is interesting to note that nine of out of the top ten container ports are in Asia and they are all competing for transshipment cargo. In this paper, Hong Kong and Taiwan's current role as a transshipment hub are examined in the greater China region where direct transportation link (DTL) policy has been implemented. As a transshipment hub, Hong Kong has enjoyed a steady increase in cargo flows since 2005.[1] Hong Kong's transshipment hub status is unwavering as there is a lack of transportation policies between Taiwan and the Mainland. However, the DTL policy opens direct cargo flow, by sea and air, across the Straits between Taiwan and the Mainland China. Without direct flights to Taiwan from the Mainland, many thousands of Taiwanese companies based in Guangdong and Fujian provinces have to hub their components and finished products in their export operation through Hong Kong. Now related logistics stakeholders in the region have to carefully frame the global transport network and select transshipment hub accordingly.

In the following sections, we first review relevant literatures and develop a research framework for this study. Having a number of group discussions with logistics practitioners, we formulate logistics stakeholders' decision model as an analytical hierarchy that is generic for transshipment hub selection. Using the specific case of Hong Kong and Taiwan provides a unique opportunity and focal point for discussions among participants. We can then determine the relative importance of the decision concerns. We also conduct a comprehensive comparison between the two hubs to further examine the diversity of logistics stakeholders' views. Discussion on managerial implications is provided to enhance the generalization of this study in the last section.

2. Literature review

In the prior research, selection of a transshipment hub has been seldom studies. Instead, sea port selection problem has been extensively studied in the last decade, with respect to dominant sea freight regions, such as Greater China (Lirn, Thanopoulou, & Beresford, 2003), Southeast Asia (Tongzon, 2009), Western Asia (Sayareh & Alizmini, 2014), North American (Guy & Urli, 2006; Steven & Corsi, 2012), and European area (Onut, Tuzkaya, & Torun, 2011). These single transportation mode studies were conducted from the perspective of logistics stakeholders in the sea transport community. For instance, Nir, Lin, and Liang (2003) examined Taiwan shippers' behavior when making selection among the three local sea ports, while Lirn et al. (2004) studied the same set of ports from the perspective of global ocean container carriers. These studies provided an understanding of sea port selection in key global regions. More recently, Wang and Hong (2011a) argued, with respect to air freight transportation, Taiwan had taken on this endeavor to gain competitive advantages under Direct Transport Link policy. In our study, we are not looking at selection of a single-modal port among competitive ones in a region, but rather at the selection of a transshipment hub, where choices of different modals are presented, in the context of global cargo logistics.

Moreover, methodologies used in most existing port selection studies were either economic models or statistical analysis, offering what is relevant, but did not provide us the understanding of strategic and operational concerns in transshipment hub selection. Malchow and Kanafani (2004) proposed a discrete choice model for selecting a US port for maritime shipments. Chou (2007) applied fuzzy multiple criteria decision making method (MCDM) in selecting a transshipment container port. Based on the Air Cargo Supply Chain Operations Reference (ACSCOR) model, Low, Yuan, and Tang (2008) conducted a statistical analysis to study competitive advantages of Hong Kong and Singapore ports. Alonso and Sanchez-Soriano (2009) analyzed actual inter-port traffic distribution using a discrete choice modeling approach, and investigated impacts of port location on port selection from the perspective of hinterland.

Other studies made use of AHP approach to identify and assess critical factors in the port selection from a particular perspective of logistics stakeholders, with respect to single ports of different nature. Both AHP-based studies conducted by Lirn et al. (2003, 2004) found that, from a carrier's perspective, factors of *port location* and *carrier cost* were more important than factors of *port management* and *port physical characteristics* in the port selection. Song and Yeo (2004) conducted a competitive analysis of major Chinese container ports by using AHP approach. The study also identified *port location* is an important concern, while *insufficient*

[1] An exception in 2009 due to SARS (severe acute respiratory syndrome) outbreak.