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An evaluation of competition and selection criteria between dry bulk terminals in Izmir

Gökcay Balci*, Ismail Bilge Cetin, Soner Esmer

Dokuz Eylul University Maritime Faculty, Tinaztepe Campus, 35160, Buca-Izmir, Turkey

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ABSTRACT

Port competition and selection studies have mostly focused on container shipping, and the competition among dry bulk terminals has been ignored in the literature. Thus, the purpose of this study is to explore terminal competition and selection criteria in the dry bulk market with a case study applied in Izmir, Turkey. A mixed methodology approach that combines qualitative and quantitative data is employed. The paper reveals seven main criteria for dry bulk terminal selection. One of them, the physical and technical capability of the terminal, is found to be a pre-condition that cannot be traded off. The importance weights of the other six selection criteria are ascertained using the fuzzy analytic hierarchy process (AHP) analysis. Cargo handling costs are the most important criterion, while the other criteria in rank order are damage/loss performance, location, handling speed, responsiveness, and storage facilities. The results indicate that dry bulk shippers have different rankings of selection criteria, thus suggesting that shippers' expectations are heterogeneous. Although dry bulk terminal selection criteria are similar to those in container shipping, the content is quite different. Another interesting result is that shippers in the dry bulk market are concerned with some similar issues as carriers in container shipping when selecting a port.

1. Introduction

Ports play a significant role in global trade, supply chain systems, and the economic development of a region. Ports are considered as integrated logistics centres in which the value is delivered to shippers and logistics service providers (Robinson, 2002). Ports significantly affect the success of the total logistics and the competitiveness of their users. Ports are also essential transport nodes that affect the spatial structure of cities (Fujita and Mori, 1996). Considering the vital role of ports and increasing competition among ports in recent decades, port selection criteria have attracted the attention of both academics and practitioners (Notteboom et al., 2013). However, previous work has only focused on the container shipping market, and no academic paper has thus far addressed the competition or selection criteria in the dry bulk context.

Dry bulk exporters and importers also face fierce global competition, and thus, they strive to achieve efficiency and effectiveness in their supply chain system (Nicholson, 2006). Therefore, a competitive port environment for dry bulk terminal users is also of great importance. However, it is not surprising that competition and selection criteria have not been investigated in dry bulk shipping because bulk shippers may be captive to a single port in many countries. This captivity may arise from a lack of sufficient internal transport systems, the geographical advantage of a single port, and the commodity type (Goss, 1990). Another reason could be the excessive land transport costs and times required for bulk shipments (Stopford, 2009). Rodrigue et al. (2013) also claim that the hinterland of bulk products is smaller because of the nature of goods and high transport costs. Bulk shippers are very sensitive to logistics costs since the cargo value per ton is lower compared to general cargo (Trace, 2008). As a result, bulk cargo owners usually locate their warehouse or factory close to a single port.

Nevertheless, competition among some bulk terminals still occurs because of two reasons. First, some bulk cargo owners are located at similar distances to more than one port. For instance, dry bulk terminals in northern Adriatic ports (Rijeka, Koper, etc.) compete with each other and with the terminals in northern Europe for the central European market (Austria, Czechia, and South Germany). The bulk cargoes that are subject to competition for this market include, for example, soybean meal, grain and cereals, perlite, phosphates, and alumina. Goss (1990) also discussed the competition between ports on these two different coastlines. The web pages of dry bulk terminals in these regions emphasize the capacity and certification of storage facilities, the adequacy of inland connections, and the effectiveness of cargo handling with the latest technology (see website links in references). For instance, the dry

* Corresponding author.
E-mail addresses: gokcaybalci@gmail.com, gokcay.balci@deu.edu.tr (G. Balci), ismail.cetin@deu.edu.tr (I.B. Cetin), soner.esmer@deu.edu.tr (S. Esmer).

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bulk terminal of the Port of Koper underlines its high service quality in its handling of bulk cargoes such as borax, cement, clinker, perlite, and scrap. The sales department of the dry bulk terminal in Koper indicated that the terminal competes for central and eastern European markets with the terminals in northern Adriatic ports and also with the terminals in northern Europe (Port of Koper, personal communication, November 15, 2017).

Intra-port competition, in which at least two terminals compete with each other (de Langen and Pallis, 2006), is the second way that competition takes place among dry bulk terminals. In Turkey, the government promotes competition either through port concessions or allowing private parties to build their own terminals close to each other (Esmer and Duru, 2017). As a result, intra-port competition among bulk terminals is achieved at different locations, such as Nemrut Bay and Izmit Bay. The majority of private bulk terminals are operated by different bulk cargo owners, and a few of them, such as Habaş Terminal in the Port of Nemrut Bay, use the terminals only for their own cargo. However, many of the terminals handle other shippers' cargoes in large amounts as well and compete with each other to attract these bulk shippers. For instance, approximately 90% of total cargo throughputs of Bati Liman and 70% of Ege Gübre consist of other shippers' bulk cargoes (Türklim, 2017). The Port of Antwerp is also an example where intra-port competition takes place between bulk terminals. Eleven bulk terminals at the port compete with other ports and between themselves (Wim Dillen, personal communication, November 16, 2017).

Although competition in dry bulk seems to be more complicated compared to the container market, competition among dry bulk terminals is in practice a reality. However, no research indicates what criteria bulk shippers consider when they select a bulk terminal or the importance ranking of these criteria. Therefore, this paper aims to explore the competition and selection criteria in a dry bulk terminal context and focuses on dry bulk terminal competition and choice in Izmir, Turkey. In this region, four of the private bulk terminals in Nemrut Bay Port and the bulk terminal in state-owned Izmir Port compete for bulk cargoes.

The research first investigates the port choice literature to identify some criteria for bulk terminal selection. Then, the paper conducts semi-structured interviews with industry experts to perceive the nature of the competition and selection criteria among dry bulk terminals. Then, the fuzzy analytic hierarchy process (AHP) is conducted with dry bulk shippers, port agents, and the competing terminals in Izmir to ascertain the relative importance of each criterion. The competition level among bulk terminals in the region is also asked to the respondents in the survey. Since container port competition and selection is well understood and conceptualized in the literature, the results of our study are discussed in comparison to container port studies for better illustration.

2. Literature review

The literature on dry bulk terminals is quite limited in terms of the subject variety of the studies. The absence of studies about dry bulk terminals is also addressed by Lee et al. (2014). Most of the studies analyse the design and operation of bulk terminals (Lodewijks et al., 2007; Schott and Lodewijks, 2007; van Vianen et al., 2014). Van Vianen et al. (2014), for instance, attempt to ascertain the necessary storage yard area for a dry bulk terminal. Hu and Yao (2012) investigate the scheduling of stackers in dry bulk terminals. Ernst et al. (2017) develop a mathematical model for the berth allocation problem in dry bulk terminals. Yang et al. (2017) study the evolution of the dry bulk port system in Yangtze River in China. On the other hand, some papers include dry bulk terminals and cargo throughputs when assessing the efficiency of seaports (Barros, 2003; Güner, 2015). However, no study has specifically focused on competition between dry bulk terminals.

Nevertheless, some authors mention bulk terminal competition briefly or indirectly in their studies. For instance, De Langen et al. (2012) assessed the terminal concessions of the Port of Rotterdam and underlined two factors regarding why Rotterdam is much more competitive compared to German and French ports in terms of bulk cargo. They highlighted the physical availability (large draft and water approach) and inland waterway connection to bulk users as the two crucial competitive advantages. Esmer et al. (2016) investigated the determinants of non-price competition among ports in Turkey through survey research and confirmatory factor analysis. In the survey, the authors included both container terminals and dry bulk terminals that are in competition with other bulk terminals. The paper revealed "customer care, customization, service expansion, auxiliary service, and diversification" as the five factors of non-price competition.

Since no study has thus far investigated the port choice in dry bulk, this paper considers container port choice studies as a benchmark, which is also applied by Yang et al. (2017) who use a container port evolution model as a benchmark while studying the dry bulk port system. In the literature, some authors studied port selection based on carriers as the decision maker (Lirn et al., 2004; Guy and Urli, 2006; Tongzon and Sawant, 2007; Tang et al., 2008; Saeed, 2009; McCalla, 1999; Wiegmans et al., 2008; Chang et al., 2008; Yeo et al., 2014). Various authors focus on shippers as the decision makers of port selection (Garcia-Alonso and Sanchez-Soriano, 2009; Murphy and Daley, 1994; Nir et al., 2003; Onwuegbuchunam, 2013; Tiwari et al., 2003; Ugboma et al., 2006). On the other hand, other studies consider either the shipper and the carrier together (Malchow and Kanafani, 2001) or include more parties such as forwarders, shipping companies and ports (De Langen, 2007; Murphy et al., 1992; Song and Yeo, 2004; Yeo et al., 2008). Akbayirli et al. (2016) and Tongzon (2009) evaluated the preferences of only freight forwarders as the decision maker. Although these studies vary regarding the decision makers, all of them investigate port selection in container shipping.

Considering the selection criteria literature within the perspective of transport geography, the accessibility of the port emerges as an important issue. Accessibility, together with costs and agglomeration, plays a significant role in shaping the spatial structure (Rodrigue et al., 2013). Navigational accessibility in port choice studies is usually represented by the draft or water depth (Tang et al., 2008; Wiegmans et al., 2008) and port infrastructure (Guy and Urli, 2006; Lirn et al., 2004; Tongzon and Sawant, 2007). Navigational accessibility is crucial because carriers in liners and shippers in bulk shipping pursue economies of scale using larger vessels. Since many ports are geographically constrained for serving such large vessels, carriers and shippers are forced to choose between certain numbers of ports (Merkel, 2017). Valemax vessels, the largest ore carriers with 400.000 DWT capacity and 23 m of draft requirement, can only call a few bulk terminals in the world. Similarly, not every port is capable of handling the new generation 21.000 TEU container vessels.

On the other hand, the fact that port users pursue economies of scale also shapes the geography. Many ports today conduct dredging to increase the depth of the approach channels and berths. For instance, MIP Mersin Port in Turkey has increased its draft capacity with the aim of becoming a hub port in the Eastern Mediterranean. In addition to dredging, to be accessible for larger vessels, ports also structure larger berths and purchase cargo handling equipment with higher capacities. They also need to increase the space at the terminal for the temporary storage of cargoes. By the end of 2015, the Port of Felixstowe completed dredging the quay and approach channels, extended its berths and purchased larger gantry cranes to attract carriers with mega containerships.

Hinterland accessibility of a port is another concern of port users. Port users consider how accessible the port is via road, rail, and inland waterway alternatives. Ports around the globe do not have equal geographic conditions in terms of hinterland accessibility. Northern European ports, for instance, are highly accessible through inland waterways, roads and railways (Rodrigue and Notteboom, 2013). This geographical advantage of Europe allows for both carriers and shippers