



Exploring strategic characteristics of intermodal grain terminals: Empirical evidence from Brazil



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ABSTRACT

Firms in the transportation industry are continuously evolving in order to build competitive advantages. Understanding who the competitors are and how they behave is a basic prerequisite for firms to adopt the right strategic positioning. Strategy and performance, therefore, are considered to be inseparable. In this manuscript, we exploit these two central areas in the field of business management from the perspective of grain terminal operators. A framework of analysis based on robust operations and strategic management literature is built to identify the strategic pattern of 24 intermodal grain terminals spread throughout the five Brazilian regions. The operational efficiency of the terminals is assessed through Data Envelopment Analysis. Subsequently, strategic groups are identified with the support of Cluster Analysis. Results suggest the existence of two major strategic groups: diversified small-scale terminals and focused large-scale terminals. The study is concluded by arguing that diversified small-scale terminals tend to offer a wider range of secondary services as an alternative to counterbalance their small transshipment scale, therefore, are likely to adopt a differentiation strategy; large-scale terminals, on the other hand, tend to focus mainly on the transshipment process, thus, are likely to adopt a cost leadership strategy. Theoretical and managerial implications resultant from the findings are presented and discussed.

1. Introduction

The continuous growth of the world's population over the past few decades has increased the concern about food supply, especially in non-self-sufficient nations. In this scenario, Brazil faces an odd but also challenging opportunity to keep expanding its participation in the global market at a high competitive level. The country is the world's major producer and exporter of some agricultural goods, such as coffee bean, sugar and orange juice. It also leads the export of meat (bovine and pork) and soybean complex products (grain, bran and oil). The steady growth in agricultural production is a result of several factors, such as the expansion of cultivated areas, appropriate climate conditions, research of new varieties of plants, chemicals, machinery, handling and effectiveness of producers (Brasil, 2016a).

According to the Center for Advanced Studies on Applied Economics (Cepea, 2015), the Brazilian economy is highly dependent on the agribusiness sector, since historically it has accounted for more than 22% of the country's gross domestic product. The dependence on cultivation and commercialization of agricultural commodities requires

the right strategic positioning from producers, logistic service providers and industrials in order to achieve and sustain competitive advantage in the long term. Although agents in the primary sector have increased the productivity year by year, the lack of infrastructure and intermediary agents, what Khanna and Palepu (2010) wisely described as “institutional voids”, have kept the transaction costs relatively high, eroding substantial part of the profit margin from several supply chains.

Given the low value-added of agricultural commodities, the cost management of agri-food chains is often very strict. Therefore, one of the main challenges faced by Brazilian grain producers is related to logistics issues, especially the cost of transportation (Friend and da Silva Lima, 2011). The challenges increase once the grain producing areas have moved towards distant and remote areas in the upper Midwest region of the country, such as Northern Mato Grosso State, where logistic infrastructures have not reached an adequate level of development. The use of combined means of transport to move grain production from farms to either local industrial processing facilities or export ports emerges as a reasonable alternative not only to lower costs but also to reduce social and environmental impacts (Konings, 1996).

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The association of multiple modes of transport for freight movement is a common practice in the transport systems, however, a consensus on a universal terminology has not been reached. The most common concepts used are multimodal transport, combined transport, intermodal transport and co-modality (Reis et al., 2013). Among these terms, two deserve attention, since they have been used interchangeably: intermodal transport and multimodal transport. The prevailing definition among scholars is that multimodal transport is the “*carriage of goods by two or more modes of transport*” (United Nations, 2001, pp16), while intermodal transport is the “*movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing modes*” (United Nations, 2001, p. 17). In the Brazilian territory, there is a specific legislation for them. Multimodal transport consists in moving freight from its origin to its final destination under a single contract, whereas intermodal transport uses unilateral contracts in each stage of the transportation process (Bertaglia, 2009). Since the movement of agricultural products from farm to the final destination is normally conducted by multiple agents and contracts, we adopted the terms “intermodal transport” and “intermodal terminal” in this work.

In this context, intermodal terminal, the link between two or more means of transport, becomes essential to efficiently execute the intermodality. Because it involves the coordination of several agents such as shippers, logistics service providers and intermodal service providers (Abramović et al., 2012), intermodal terminal operators must meticulously know each resource and capability that the company possesses to employ a strategy capable of generating profits in the long run. The adoption of the right strategic positioning may define if a terminal will succeed or not. The importance of strategic decisions has not been translated into significant numbers of scientific studies to grain terminals if compared, for example, to airports or container seaports. This statement can be confirmed through a search on any scientific search engine. For instance, we performed searches on the world's three major search engines (Scopus, Web of Knowledge, and ScienceDirect) by using the following search string: “grain terminal” AND “strategy” on December 2016. In total, only two peer-reviewed articles containing these terms in the title, abstract or keywords were found, but none employed strategy in its strict sense. Alternative computational searches were performed, but we also failed to find works related to the topic.

In this article, therefore, we aim to initiate a discussion about the importance of resources and strategic positioning for intermodal grain terminals. Empirically, we seek to find out if there is any strategic pattern among Brazilian grain terminals by applying concepts of strategic groups. We complemented our analysis by deploying Data Envelopment Analysis (DEA) in the discussion. This is another differential of our work because even though strategy and operational efficiency are closely related, this junction is unusual in the literature on intermodal terminal. By shedding light on these topics, we seek to provide insightful information to public and private agents on how intermodal grain terminals in Brazil appear to behave both in operational and strategic manners and what are the implications of such patterns.

The structure of this manuscript is organized as follows. Section one consists of this brief presentation of the topic and research gap. In section two, we draw a framework of analysis by presenting a literature review with concepts necessary to the understanding of this study. In section three, we present the material and methods used to accomplish the proposed goals. Then, in the fourth section, we present and discuss our findings. Lastly, in the fifth section, we summarize the research, presenting some concluding remarks, limitations and suggestions for future studies.

2. Theoretical background

The analytical framework of this research is built on three subsections. The first one presents concepts regarding intermodal terminals in

general. The second one focuses on the importance of the intermodality to the movement of grain in the Brazilian agribusiness chain. The third one discusses the central concepts of strategic theory to support our findings.

2.1. The role of intermodal terminal

The intermodal terminal is the interchange point (Monios, 2011) that enables the use of multiple modes of transport (Martins et al., 2014) in the global freight distribution (Rodrigue and Notteboom, 2009). This kind of facility offers transshipment as its core activity (Höltgen, 1996) but can also provide related services (Martins et al., 2014), such as inspection, customs clearance, cleaning, minor repairs (Bergqvist et al., 2010), storage (Rodrigue and Notteboom, 2009) and so forth, as non-core activities (Monios, 2011). The intermodal terminal itself is considered the weakest link and one of the major generators of costs in the intermodal transport (Salucci, 2006), once its operation tends to affect the whole intermodal transport competitiveness (Chatterjee and Lakshmanan, 2008). Thus, the development of a proper strategy might determine how successful and profitable a terminal, as well as supply chains, will be.

Studies on intermodal terminals have encompassed a wide variety of approaches. Wilmsmeier et al. (2011), with a territorial view, pointed out to the importance of attraction of service providers to surrounding areas, jobs creation and local development. Konings (1996) shed light on synergy gains enabled by integrated centers for transshipment, storage, collection and distribution of goods. On the other hand, Bergqvist et al. (2010) analyzed the drivers of intermodal terminals development. Through case studies conducted with container terminal operators in the Swedish market and with the support of rational choice theory (Olson, 1965) the authors concluded that profitability is the major driver of development, followed by enthusiastic and committed political entrepreneur, area of influence, and ultimately, the credibility of large shippers involved. These and other approaches can be found in the transport literature.

The aforementioned studies show how vast and rich this subject of analysis is and how it could be extended. For instance, the amount of studies on intermodal terminals in less developed countries is considerably smaller when compared to developed nations. According to our search, grain terminals have also received less attention from researchers when compared to other types of terminals. These two streams of research combined can be analyzed through multiple facets, emerging a third line of study. In this case, we merged them and chose to shed light on the strategic perspective. As can be visualized in the next section, intermodal terminal plays an important role in freight transport. In large countries where the economy is highly dependent on agricultural and mineral commodities, such as Brazil, intermodal and multimodal transport should be exploited as much as possible in order to enhance the competitiveness of local companies, and consequently the value chain as a whole.

2.2. Intermodality and intermodal terminals in the Brazilian agribusiness

In Brazil, the first architecture of a national transport network plan was elaborated in 1934. This project was reviewed by a committee of experts in 1946 and started to be put in practice in 1947. Unfortunately, the plan for development of the national transport network did not contemplate all regions equally: massive investments were allocated to build roadways and railroads close to large urban cities, leaving aside the remote zones in the countryside (Carvalho, 1973). Nowadays, those remote areas are formed by a mix of prosperous cities and large agricultural producing areas. The decisions taken in the past created a completely unbalanced transport network, with the roadway mode still being largely used for freight movement in the country, causing a variety of social, economic and environmental problems. Given the asymmetries presented, the greatest challenge is to counterbalance the

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