

## **Transportation Cost and International Trade**

### **INTRODUCTION**

Given that it is unavoidable the existence of the transportation cost within the international trade environment, several studies have focused on describing the inherent relationship between both of them. This study is a brief review of the literature regarding the transportation cost-international trade link. The review is organized as follows: the next section briefly explains the transportation cost as an impediment to trade, transportation and LDCs, as well as the value of the trade-transportation cost link. In the second section the transportation cost-infrastructure link is stated. The transportation cost pros in addition to how to improve it are presented in section four and the last section of the review asserts conclusions.

### **LITERATURE REVIEW**

Based on classical economic models, gains of trade will derive from the exchange of goods between countries. These countries must specialize in the production of defined goods depending on the specific advantage of the country (technology, factor endowment, etc.). However, in order to be traded, the products to be produced need to be transported.

As defined by Coyle, et al. (2003), "Transportation is the physical thread connecting the company's geographically dispersed operations. More specifically, transportation adds value to the company by creating time and place utility; the value added is the physical movement of goods to the place desired and at the time desired" (p. 339). Actually, transportation "...permits goods to flow between the various fixed points and bridges the buyer-seller gap" (Coyle, et al., 2003, p. 338). Transportation providers utilize resources to make possible the physical movement of the goods, and they must recover the cost of

providing this service –the transportation cost. To be more specific, “transportation cost includes the rates, minimum weights, loading and unloading facilities, packaging and blocking, damage in transit, and special services available from a carrier –for example, stopping in transit” (Coyle, et al., 2003, p. 342).

Since it is unavoidable the existence of the transportation cost within the international trade atmosphere, several studies have focused on describing the inherent relationship between both of them, because even though “[t]ransport costs incurred on traded goods are only one of the direct costs associated with distance, ... they are perhaps the one that is most readily observable” (Henderson et al., 2001, p. 5).

### **Transportation Cost as an Impediment To Trade**

In 1943, the Vice President of the United States Henry A. Wallace stated, “Excessive transportation rates burden agriculture and industry and trade ... high rates have limited consumption and have penalized the farmer for producing abundantly” (Wallace, 1943, p. 42).

Finger & Yeats (1976) affirm that transportation cost “... tend[s] to protect domestic producers from foreign competition -as do such artificial barriers as import quotas, tariffs, etc.” (p. 169). Actually “...transport costs, like tariffs, influence the magnitudes of trade flows, and types of goods exchanged internationally” (Yeats, 1977, p. 97). Moreover, “[t]ransport costs pose obstacles to the movement of goods and services so they have important implications for the way a trading world economy is affected” (Cukrowski & Fischer, 2000, pp. 311-312).

Regardless of the awareness of the economists about the important role “... that access costs play ... in limiting developing countries' exports to the industrial markets” (Yeats, 1977, p. 97). The same importance has not been given to the study of transportation cost “...due to a

lack of available data on their incidence, or to the (erroneous) assumption that these charges were exogenous variables outside the direct control of policy makers. Another reason for this neglect may have been the presumption that the influence of transport costs, relative to tariffs, is generally small” (Yeats, 1977, p. 97). However, “...the overall degree of protection afforded by international transportation costs is at least as high as that afforded by tariffs” (Finger & Yeats, 1976, p. 173).

Another important role that transportation cost has been indicted for is the one of “tariff counterpart” because besides of emulating the tariff’s behavior, “[a]n increase in transportation costs... would be sufficient to more than offset the estimated overall reduction ...in the United States tariff...” (Finger & Yeats, 1976, p. 175). This is reinforced by Wigie (1992) “... the cost of allocative distortions caused by the tariff are reduced by the presence of transportation costs...” (pp. 203-204).

### **Transportation Cost and Less Developed Countries (LDCs)**

As Pease (1976) notes, “[t]ransport costs are present in all economies, but they take on particular importance in underdeveloped countries” (p. 229). This emphasized importance is because “...transportation costs, like tariffs, tend to escalate with stage of processing (Finger & Yeats, 1976, pp. 173-174). In fact, “[a]nalysis of the transport charges by processing stages shows that these costs escalate with increased fabrication” (Yeats, 1977, p. 98). Thus, “...it appears that transport costs, like tariffs, may in cases exert a negative effect on the growth of processing industries in developing countries” (Yeats, 1977, p. 104). Additionally, the stronger influence of transportation cost in Less Developed Countries (LDCs) is related to the fact that “[t]ypically, these countries have poor transport infrastructures and primitive

distribution systems, making the cost of trade across space higher in LDCs than elsewhere (Pease, 1976, p. 229).

Within some of the factors that cause higher transportation cost, Sapir (1983) mentions: inefficient port operations...the volume of their shipments...their lack of bargaining power.... competing with countries which have a strong locational advantage... transport rates seem to fluctuate greatly over time.... the unit value for [their]... exports is substantially below that of competitors “ (p. 248). Additionally, McFarland (1985) suggest that “[d]eveloping countries generally export goods with lower value to weight ratios than other countries; developing countries may have inferior port facilities; they often generate so little traffic that ships serving them either must sail with excess capacity or must call at several different ports; and they often are farther from [their destination]...” (pp. 565-566). “All of these phenomena have been observed in LDCs and have been cited as evidence of rampant market imperfections... Perhaps LDC economies are more efficient than they are usually given credit for” (Pease, 1976, p. 244).

In summary, ad valorem transportation costs are of roughly the same average magnitude as tariffs, and tend, as tariffs, to escalate with stage of processing, and again as tariffs, to bear more heavily on the exports to the United States of developing than of developed countries (Finger & Yeats, 1976, p. 174).

The significance of transportation cost is so strong that it has “...long been considered an important determinant of food prices, and, thus, farm-level demand (Dunn et al., 1987, p. 394). Essentially, “[t]he share of national production of an agricultural commodity produced in a region can change over time. Transportation cost changes are often identified as major determinants of these changes in interregional competition (Dunn et al., 1987, p. 393).

### **Trade-Transportation Cost Link Value**

The transportation cost incurred by a country when importing goods varies from “...a few percent of the value of trade, up to 30-40% for the most remote and landlocked ... economies.” And the consequences of this high transportation cost are: “First, they are a real cost, using up scarce resources. Second, they choke off trade” (Henderson et al., 2001, p. 5).

The trade value-transportation cost link is so tight that according to Martinez-Zarzoso et al.'s (2003) findings “...doubling transport costs leads to a reduction in import value of between three and five times” (p. 194). In a less aggressive way Henderson et al. (2001) estimate that “... doubling transport costs reduces trade volume by around 80%...” (p. 6). However, they establish that “[t]he trade reducing effect is strongest for transport intensive activities - i.e., activities that are dependent upon exports for sales and/or imported intermediate goods for production” (Henderson et al., 2001, p. 6). It is so strong the importance allocated to transportation cost that Martinez-Zarzoso et al. (2003) affirm that “...to some extent, import choices are made in order to minimise transportation costs” (p. 180).

Egger (2005) stresses, “...the importance of a reduction in trade costs is positively related to the level of trade” (p. 604). Politically talking he suggests “... that transport cost reductions are most ‘efficient’ for OECD-RoW [Rest-of-the-World] trade relationships, because the marginal trade cost effect is highest there (Egger, 2005, p. 603). Within his 2005 study Egger provide evidence that the “...transport cost reduction is found to have the strongest impact on average for trade openness between OECD and non-OECD economies” (p. 604).

Meanwhile McFarland (1985) simply declares “Almost all US trading partners benefited from declining freight rates for total imports “(p. 568). Jenkins & Kuo (2002) provide supportive evidence for reduction of transportation cost

...the allocation of the economic benefits depends upon whether the goods are traded internationally or regionally. When the goods are internationally traded, producers of the exporting country benefit from the reduction of transportation cost. In the case of regionally traded goods, the gains from the reduction of transportation cost will be shared by producers in the exporting country and consumers in the importing country...( p. 1).

### **Transportation Cost and Infrastructure**

Limao & Venables (2001) observe:

The real costs of trade -the transport and other costs of doing business internationally- are important determinants of a country's ability to participate fully in the world economy. Remoteness and poor transport and communications infrastructure isolate countries, inhibiting their participation in global production networks... As liberalization continues to reduce artificial trade barriers, the effective rate of protection provided by transport costs is now, in many cases, considerably higher than that provided by tariffs (p. 451).

Regarding infrastructure, it “... is an important determinant of transport costs, especially for landlocked countries. (Limao & Venables, 2001, p. 451). Stressing even more the influence of infrastructure, Martinez-Zarzoso et al. (2003) support that “... the transport cost estimation show that higher distance and poor partner infrastructure lead to a notable increase in transport costs...” (p. 179).

Limao & Venables (2001), provide the quantitative importance of the infrastructure effect: “If a country could improve its infrastructure from the median to the top 25th percentile... this [would be]... equivalent to becoming 2,358 km closer to all its trading partners” (pp. 459-460). Alternatively, “...deterioration in infrastructure from that of the median country to the 75th percentile raises costs, according to our shipping data, by an amount equivalent to 3,466 km of sea travel or 419 km of overland travel. Using

the CIF/FOB ratio, the equivalent distance is 2,016 km. The impact on trade volumes is equivalent to an extra 1,627 km distance. (Limao & Venables, 2001, p. 470).

Concluding with the transportation cost-infrastructure relationship, Martinez-Zarzoso et al. (2003) emphasize, “[t]he proven impact of infrastructure on transport costs and trade points towards the importance of investing in new port infrastructures as a way of fostering trade and income in developing countries” (p. 194). Additionally, Limao & Venables (2001) “...show that infrastructure is quantitatively important in determining transport costs, a finding with important policy implications for investment in infrastructure. Poor infrastructure accounts for 40 [to 60] percent of predicted transport costs...” (p. 452).

### **Transportation Cost; an Impediment to trade?**

Within his 1985 study, McFarland writes, “[t]ransportation costs have continued to be a significant barrier to US imports; ... However, relative transportation costs have declined sharply in recent years” (p. 568). “The old rule of thumb that international transportation costs are 10 per cent of f.a.s. value obviously no longer applies” (McFarland, 1985, p. 562).

Additionally Wigie (1992) asserts that “[w]hile the presence of transportation costs is crucial to some sectoral trade and production results, most welfare results are relatively insensitive to the spatial structure...” (p. 185). In fact,

...transportation costs play a very minor role in the determination of overall (Canada-wide) welfare effects, but may have a more noticeable effect on trade patterns and welfare of specific regions... The limited theoretical results point to effects of transport costs on both the gains from free trade, and the deadweight losses from tariffs. These effects will tend to offset one another to at least some degree, leading to a less central role for transportation costs for the purpose of analyzing welfare effects in particular (Wigie, 1992, pp. 185-186).

Limao & Venables (2001) point out that the “...distance alone explains only 10 percent of the variation of transport costs, compared with almost 50 percent when the

remaining geography and infrastructure measures are added. Clearly, distance fails to explain a significant part of the variation in transport costs” (p. 460). Cukrowski & Fischer (2000) suggest, “...additional gains from trade may emerge from reductions in aggregate delivery costs owing to scale economies” (p. 312). Additionally, “[t]rade between two countries may also result from economies of scale to transportation” (Cukrowski & Fischer, 2000, p. 322).

Within his 1981 study, McRae writes:

Accurate measurement of the importance of transportation cost barriers in terms of their overall effect on regional value added, that is, returns to regional labour, land, and capital, would seem to make perfect sense given the federal government's use of transportation policy as a tool of regional income support (p. 156). [However]...the level of effective distance protection is barely over 1 per cent... On the basis of this low percentage difference in regional value added attributable to distance charges, it would appear that interregional transport costs alone are not a very significant factor in explaining regional disparities in income. (McRae, 1981, p. 162)

Additionally McRae (1981) argues that [u]sing a simple general equilibrium model...it is unlikely that transportation subsidies would be effective in raising regional income in a poor area (p. 162). Stressing the transportation cost role, Haskel & Slaughter (2003) find that “...the rise in the skill premium mandated by price changes induced by tariffs or transportation costs was mostly statistically insignificant. Thus, there is not strong evidence that falling tariffs and transportation costs mandated rises in inequality working through price changes” (p. 646).

Regardless of the sharp rise in fuel prices during 1976-1981, transportation cost declined; McFarland (1985) proposes “...two main reasons for this decline: growing excess capacity, particularly in ocean shipping; and technological change. Major technological innovations that became more widely used during this period were wide-bodied jets, containerisation, large-scale tankers, and large-scale dry bulk carriers” (pp. 566-568). These



reasons mentioned by McFarland are just few of the benefits that the transportation cost challenge can bring to the economy, maybe the most notable one is that “[t]ransportation makes significant contributions to the U.S. economy” (Stephenson, 1987, p. 11) as well as to the other economies.

### **Transportation Cost Improvement**

Given that it is unavoidable the existence of the transportation cost within the international trade atmosphere, it is extremely important to try to overcome the burden that transportation cost represents by improving it.

A simple way of improving transportation cost would be “[b]y taking a hard look at how a company plans, controls, and coordinates its use of international transportation services, it may be able to reduce costs as much as 30 to 40 percent” (Ramsdale & Harvey, 1990, p.23). “Frequently, managers treat transportation costs as part of the item cost when purchasing from a supplier. Such thinking oversimplifies an important decision-making parameter” (Carter & Ferrin, 1996, p. 58). Actually, the explicit recognition of transportation costs as a separate decision variable can greatly influence the achievement of an optimum outcome (Carter & Ferrin, 1996). Furthermore, “[b]y devoting the necessary internal and external resources to develop and implement a well-conceived plan, firms can establish clear and effective transportation guidelines that make it possible for individuals and departments to work together to reach a level of efficiency that translates directly into enhanced profits” (Ramsdale & Harvey, 1990, pp.26-27).

Ramsdale & Harvey (1990) propose the following eight approaches to improve international freight efficiency:

1. Communicate internally to make the best use of resources.
2. Compare available rates and services on a regular basis through a formal process.

3. Establish a strategy for using systems to help capture and manage transportation-related data.
4. Develop a strategy that properly balances IATA (International Airline Transport Association) and consolidation services.
5. Develop a strategy that balances international airfreight (IATA and consolidation) with the use of international small package or courier shipping.
6. Establish Time Volume Contracts (TVCs) for ocean shipping where advantageous.
7. Use multiple customs clearances where advantageous.
8. After developing an effective program, use the favorable discounts with your preferred carriers in third-party and freight-collect situations (pp. 23-27).

Another way of improving transportation cost would be through Supply Chain

Management (SCM);

Over the last twenty years, the concept of integrating functional areas within the firm has achieved a high level of acceptance. SCM extends this concept of cooperative integration beyond the firm to all companies in the supply ... Supply chain management (SCM) is an integrative approach for planning and controlling the flow of materials from suppliers to end users. SCM attempts to manage channel relationships cooperatively for the mutual benefit of all parties in the chain. The goal of SCM is to meet customer service objectives while simultaneously minimizing inventory and associated costs. Thus, it has been stated that SCM and cooperative buyer-supplier relationships could prove useful in meeting the goals of the logistics function. (Carter & Ferrin, 1995, p. 189).

### **CONCLUSION**

Even though it is noticeable the burden that transportation cost represents for the goods traded internationally; the cost paid for the transportation of the goods is unavoidable. However, this burden is decreasing constantly.

To diminish the influence of the transportation cost over the value of the goods it is mandatory that each country invests in infrastructure strategically. Moreover, each company is required to implement an integrative approach in planning and controlling the flow of materials from suppliers to end-users.

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