

The Current State of Mexican Logistics Operations

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ABSTRACT

While the implementation of the North American Free Trade Agreement (NAFTA) has certainly benefitted Mexico in many ways over the past fifteen years, many obstacles to developing efficient logistics operations still exist. This paper discusses these major challenges—governmental policies and insufficient transportation infrastructure—as well as several minor impediments, and it provides some suggestions for improving organizations' ability to conduct trade through Mexico.

Keywords: *International Logistics, Mexico, NAFTA, Transportation Infrastructure*

INTRODUCTION

The North American Free Trade Agreement (NAFTA) will soon celebrate its fifteenth anniversary on January 1, 2009. A subject of contentious debate at the time, most would now agree that the benefits of the agreement as a whole have outweighed the drawbacks. Even within the first five years of its implementation, trade among the three countries increased by 70 percent; and in particular, trade between Mexico and the United States increased by 71 percent and trade between Mexico and Canada grew by 80% (Carrera, 1999). A subsequent report found that trade among the three countries doubled in the first 10 years of implementation and increased further by 10 percent between 2004 and 2005 (Haverty, 2006).

For all of the prosperity that NAFTA has clearly brought to the three North American economies, Mexico still has many opportunities for improvement. Many of these opportunities are related to logistics operations, which facilitate international trade both with NAFTA partner nations and those on other continents. In fact, one study estimated that improving various aspects of the Mexican logistics system could generate US\$25 billion in cost savings (Anonymous, 2004). Even if these exact estimates are somewhat dubious, many experts acknowledge a large potential benefit in improving the Mexican logistics system. Economic opportunities for Mexico through international trade are likely to increase even further in the short term as some American companies are rethinking their global sourcing model in light of exorbitant fuel costs (Rohter, 2008). These companies may naturally look to Mexican suppliers as a lower-cost source of components and finished goods from a holistic total cost of ownership perspective. Procuring products from Mexico can also help American companies to create more responsive supply chains because the goods often have a much shorter transit time than those coming to the United States from Asian suppliers.

Other American companies may consider sourcing from Mexican suppliers as opposed to Asian suppliers for a reason other than cost. Many firms are now examining the environmental impact of their business processes, and one of the biggest environmental impacts results from the transportation of goods. These organizations have introduced the environmental impact of their transportation operations as a criterion in their supply chain design decisions (Wu and Dunn, 1995). Khoo et al. (2001) developed a simulation model for an aluminum producer that balances the interests of transportation pollution, recycling of scrap metal, marketing costs, time to market, and energy usage in order to design a supply chain system. Even retail giant Wal-Mart has re-examined its supply chain for textiles and has moved spinning and knitting operations from China to Guatemala (Plambeck, 2007). American companies that seek to limit the environmental impact of their transportation operations may increasingly choose Mexican suppliers over their more distant Asian and European competitors.

Considering this significant potential impact, it is surprising that there have been relatively few academic studies of any aspects of Mexican logistics operations and their impact on international trade. The purpose of this paper is to highlight the logistics challenges that Mexico faces and to provide some suggestions for overcoming these obstacles. Two major logistics challenges in Mexico are related to governmental policies (both Mexican and international) and inadequate transportation infrastructure; in addition, there are additional minor obstacles that have impeded the ascent of Mexico's international trade position. It is our hope that other researchers will recognize the importance of these issues and conduct in-depth studies of each.

GOVERNMENTAL OBSTACLES TO LOGISTICS OPERATIONS

When NAFTA was enacted, one of its major goals was to open the trucking industry in each country to international competition. The time-phased implementation of these policies between the United States and Mexico as outlined by the agreement was to be as follows. Foreign-operated trucks were to be allowed to operate in each country's

border states as of December 17, 1995; and on January 1, 2000, these foreign-operated trucks could haul cross-border shipments anywhere in either country (Kirk and Frittelli, 2004).¹ While Canadian and American trucks have long been able to transport shipments across the northern border, American trucks are still not allowed to operate anywhere inside Mexico, and Mexican trucks can only move shipments within special commercial zones inside the United States (F.M.C.S.A., 2008).² In order to deliver a shipment to an American consignee, Mexican carriers must transfer the shipment to an American carrier within the special commercial zone to move the shipment further than 25 miles into American territory (Harman, 2005). Maltz et al. (1996) established that there is a significant amount of cross-border freight traffic that would benefit from a full implementation of the NAFTA agreement.

Coyle et al. (2009) outline the following common yet cumbersome procedure for moving a shipment from an American shipper into Mexico. An American trucking company hauls the shipment to the Mexican border and transfers the shipment to a Mexican drayage carrier which moves the shipment across the Mexican border and into customs. After the shipment clears customs, the drayage carrier transfers the shipment to a Mexican long-haul carrier for final delivery. The documentation for the shipment follows an equally arduous process. The American freight forwarder passes the documents to a Mexican customs broker, who thereby submits them to Mexican customs officials. It is clear that the implementation of NAFTA has not allowed for a seamless flow of goods between the United States and Mexico. The border crossing process should improve in the future with the adoption of electronic information transmission for NAFTA shipments, but Mexico is a few years behind the United States and Canada in deploying these customs information systems.

A major excuse often provided for this policy stalemate between Mexico and the United States is that a sizeable percentage of Mexican trucks have been deemed unfit for safe travel on American roads. Mexican drivers were subject to different restrictions at the time NAFTA first went into effect. For example, these drivers did not have any hours of service limitations nor did they carry and maintain driver logs. As a result of these safety concerns over the Mexican drivers and their equipment, President Clinton endorsed regulations on December 18, 1995 that extended the delay of Mexican carriers' operating rights as defined under NAFTA indefinitely into the future; and this delay continues to this day (F.M.C.S.A., 2008). It is uncertain when and if these regulations will ever be discontinued because safety concerns about the Mexican carriers still exist. A January 3, 2005, report released by the United States Department of Transportation highlighted a difficulty in collecting information about Mexican carriers in order to evaluate their insurance information, their drug and alcohol testing policies, and their vehicle safety records (Harman, 2005).

The foreign carriers' operating rights were not the only aspect of the NAFTA agreement that has not been fully implemented. Additional provisions allowing for various degrees of foreign ownership in international trucking carriers have not been realized. Originally, Mexico was to allow 49 percent ownership in its international carriers by American and Canadian investors in December 1995. This percentage was to increase to 51 percent by 2001 and 100 percent by 2004. Currently Mexico does not allow any foreign investment in trucking companies based within its borders (F.M.C.S.A., 2008). This implementation failure, however, has not been very significant in the industry. A study published in 1994 around the time the NAFTA agreement first went into effect found that a majority of American carriers did not plan to acquire any interest in a Mexican carrier as a result of the lifting of ownership regulations. Only one out of 27 carriers planned to assume full ownership of a Mexican carrier. At the time, the majority of carriers sought to continue their existing alliances with Mexican carriers through interline and interchange operations (Valdes and Crum, 1994).

In addition to the limitations that still exist as a result of the incomplete implementation of the NAFTA agreement, Mexico's governmental policies create additional impediments for companies engaging in international transactions. Gonzalez et al. (2008) report that it currently takes almost twice as long to export an international shipment from Mexico (17 days) as it does from the United States (9 days) or from OECD member countries as a whole (10.5 days).³ Importing a shipment is even worse, taking 26 days in Mexico compared with only 9 days in the United States and 12.2 days for OECD member countries as a group. These delays require shippers and/or consignees to hold more inventory in their pipelines to account for the lengthy and uncertain transit time. The nominal costs of importing and exporting a shipping container mirror this discrepancy between the United States and Mexico. Clearly, Mexico has a significant opportunity to improve its import and export processes to facilitate international trade. It is important to note, however, that according to Gonzalez's (2008) statistics, Mexico has the relative fastest import and export operations among Latin American countries.⁴ This opportunity to improve the mechanisms involved in international trade extends to all Latin American countries.

¹ It is important to note that NAFTA never intended to allow for *cabotage* operations, whereby a foreign-owned carrier could transport domestic shipments. This restriction on cabotage is designed to protect the domestic transportation industry and is often seen as a national security issue as well as an economic one. Limitations of cabotage are not unique to trucking; many countries, for instance, restrict foreign operation of domestic flights as well.

² In contrast, Canadian trucks are even allowed to transport domestic shipments within the United States if such transport is incidental to their return to Canada after a cross-border haul.

³ The Organization for Economic Co-operation and Development (OECD) includes the following countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States (OECD, 2008).

⁴ Countries such as Colombia and Costa Rica, for example, require well in excess of a month to import or export a shipment.

LOGISTICS INFRASTRUCTURE IN MEXICO

By most accounts, the logistics infrastructure (i.e., quality and extent of roads, rails, airports, seaports, and pipelines) in Mexico, and most of Latin America for that matter, lags behind that of the United States, Canada, and Europe. The development of the Mexican road network in the Twentieth Century was focused domestically to connect cities with Mexico City instead of necessarily establishing road links with the United States. State ownership of the railroads, only recently discontinued, and the focus on trucking instead of rail transportation left the Mexican rail system neglected for decades (Ciccantell, 2002). The road network in Mexico is such that 53-foot trailers that are common in the United States cannot legally travel on Mexican roads because they are too large and too heavy. This limits carriers' efficiency in cross-border shipments to Mexico because either smaller trailers must be used from the start or the freight must be transloaded onto smaller trailers at the border for final delivery in Mexico. Logistics operations consistently rank high on managers' lists of challenges and frustrations of doing business in Mexico (Fawcett and Smith, 1995; Fawcett et al., 1995). The lack of a reliable logistics infrastructure makes it difficult for Mexican transportation providers to satisfy their customers because buyers consistently rank "delivery date reliability" as a top priority for transportation mode selection in international transactions (Murphy and Daley, 1994).

At first glance, transportation infrastructure may not seem like a major macroeconomic issue, but it can have a large effect on a country's economy as a whole. Calderon and Serven (2004) established a significant positive relationship between the quality and extent of a country's infrastructure and the nation's long-term economic growth. This study shows that prudent investment in infrastructure can have long-reaching implications for a nation's economy. India, another country with a reputation for poor transportation infrastructure, has committed to investing more than US\$450 billion between 2007 and 2012 to improve its logistics networks (Leahy, 2008). With that, we now investigate Mexico's annual freight traffic and aggregate expenditures on infrastructure in the nine years after the implementation of NAFTA. The annual domestic freight traffic by mode, along with those of Canada and the United States for comparison purposes, are provided in Tables 1-4.⁵ While international shipments obviously utilize these modes of transportation as well, we feel that looking at the domestic freight traffic provides a reasonable proxy for the overall figure. The accompanying annual expenditures on infrastructure by mode are given in Tables 5-8.

Table 1. Annual Domestic Freight Activity via Road in North America (in Mill. of Metric Tons)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	167.3	181.9	167.8	177.8	198.4	204.6	212.8	212.8	219.8
Mexico	366.7	383.3	332.5	380.8	394.4	413.2	409.2	411.1	416.2
United States	3060.0	3210.0	3390.0	3590.0	3710.0	3820.0	3740.0	3901.4	4069.7

Table 2. Annual Domestic Freight Activity via Rail in North America (in Mill. of Metric Tons)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	185.2	188.3	204.0	195.2	198.7	207.2	204.5	200.5	201.8
Mexico	30.7	30.2	35.4	41.8	39.8	36.2	40.7	39.3	37.2
United States	1405.8	1461.4	1438.1	1495.6	1557.9	1577.0	1580.3	1602.7	1632.1

Table 3. Annual Domestic Freight Activity via Air Transport in North America (in Mill. of Metric Tons)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mexico	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
United States	8.5	9.4	12.3	12.8	13.5	13.7	15.9	12.3	12.6

Table 4. Annual Domestic Freight Activity via Water Transport in North America (in Mill. of Metric Tons)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	50.4	48.8	46.7	48.3	52.2	54.5	53.9	62.6	68.3
Mexico	31.6	31.7	30.4	34.3	33.7	33.8	32.5	33.2	35.5
United States	985.4	991.9	1003.6	986.0	957.9	965.5	940.4	921.6	916.3

Table 5. Annual Government Expenditures on Roads in North America (in US\$ millions)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	8841	8368	8381	7809	8142	8843	8579	8722	10113
Mexico	530	571	510	492	567	700	796	919	827
United States	79375	81623	84290	89527	95556	103952	110465	118619	120803

⁵ The freight traffic data provided in Tables 1-4 and the transportation expenditures data provided in Tables 5-8 come from the North American Transportation Statistics Database.

Table 6. Annual Government Expenditures on Rail in North America (in US\$ millions)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	1508	413	359	235	201	221	276	208	237
Mexico	1169	1358	1502	955	696	568	621	572	525
United States	1043	1018	1161	1100	445	767	737	1314	1215

Table 7. Annual Government Expenditures on Air Transport in North America (in US\$ millions)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	1148	1215	779	446	329	296	399	375	412
Mexico	333	380	454	524	274	257	261	271	256
United States	16894	17237	18727	19525	21712	22017	27404	29554	28518

Table 8. Annual Government Expenditures on Water Transport in North America (in US\$ millions)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	232	330	361	285	1123	404	414	341	430
Mexico	424	418	577	147	158	194	222	228	239
United States	6628	6775	6996	7144	7684	7946	10469	8794	11349

Examination of the expenditures data above shows that the overall level of Mexico's annual spend on transportation infrastructure actually decreased over this nine-year period, a result that is somewhat ominous in light of Calderon and Serven's linkage of infrastructure and economic growth. In particular, these annual expenditures decreased for every mode of transportation except for roads. While expenditures for road infrastructure did increase, Mexico still lags woefully behind its North American counterparts on these expenditures (even taking into account the fact that Canada and the United States are larger countries geographically). This lack of sufficient investment is exacerbated by the fact that Mexican roads carry approximately twice as much freight as Canadian roads (see Table 1). Considering these road expenditures and the level of freight traffic, it is highly unlikely that Mexico's road network will sufficiently improve from its pre-NAFTA conditions.

It is interesting to note, however, that Mexico's more recent expenditures on rail transportation infrastructure are more than double those of Canada and close to half those of the United States. At the same time, Mexican railroads only move about 20% of the freight that Canadian carriers do. One wonders why all of these expenditures are justified on the rails. In addition to providing additional funds for investment in transportation infrastructure, the Mexican government must allocate these funds prudently, a recommendation echoed by Gonzalez et al. (2008) in their report.

As far as the roads are concerned, the Mexican government appears to be unsure of how to proceed. As of 2004, a proposed bill concerning road cargo regulations had sat dormant in the Mexican Congress for seven years. The legislators wanted a group of several lobbying groups to reach a consensus position before the bill would be considered again. Most reasonable observers would recognize that cooperation among these competing factions was very unlikely, if not impossible (Mireles, 2004a). As a result, the legislative process has atrophied, and the road infrastructure has not improved (and has gotten worse in some ways).

While this documented lack of government investment and intervention is troubling, the Mexican government has taken several measures to improve the country's logistics infrastructure with private funds. The Ports Law of 1993 restructured the regulation of Mexican ports and opened terminal construction, port operations, and port administration to private investors. The Mexican Federal Government maintained only a supervisory role for these private entities. The total cargo handled by the Mexican port network grew by an average of 5.7% between 1994 and 2000, up from 2% in the period from 1990 to 1994 immediately preceding the privatization of port operations. This growth, however, has been primarily concentrated in a few major ports. Now the four ports of Veracruz, Altamira, Tampico, and Coatzacoalcos handle more than 80 percent of non-oil cargo that travels through Mexican ports on the Gulf of Mexico; and the two ports of Manzanillo and Lazaro Cardenas handle 75 percent of the non-oil traffic on the Pacific side of the country. Not coincidentally, these are the ports that received the bulk of the private investment from 1994 onwards. In addition to this uneven growth, another challenge faced by the Mexican port system is the lack of coordination between the ports and the other modes of transportation such as trucking and rail that make the final delivery to the customers (Peyrelongue and Martinez, 2002).

If this problem of modal coordination could be rectified, Mexico may be able to take advantage of an opportunity that exists in the larger network of global transportation. One option for shipments traveling from Eastern Asia to Europe is to travel to a port on the west coast of the United States where the shipment is off-loaded onto a train and transported to an east-coast port. There it is loaded onto another ocean vessel for shipment to Europe. This process is known in the transportation industry as a *land bridge*. The land bridge process allows shipping companies to avoid the congestion of the Panama and Suez canals as well as to increase the utilization of their vessels. The problem now is that many American ports, especially those on the west coast, are becoming overly congested (Quinn, 2007). Mexico could likely capture some of this land bridge traffic if a smooth transfer of freight between the ports and the railroads could be

assured. There has been some support for the establishment of so-called “intermodal corridors” in Mexico to facilitate these land bridge operations as well as to handle shipments destined for American consignees, but the discussions have a long way to go (Mireles, 2004b).

Again, comparisons of Mexico’s logistics infrastructure to that of the United States and Canada may not quite be fair because the latter two countries’ economies are more developed than that of Mexico and these countries have enjoyed a longer continuous period of political stability. When compared with their Latin American and Caribbean counterparts, Mexico’s infrastructure stands up quite well. In fact, a study by Myers et al. (2002) found that American manufacturers deemed Mexico’s logistics networks superior to that of Caribbean countries in almost every facet related to attractiveness for production locations.

OTHER LOGISTICS CHALLENGES IN MEXICO

While we have discussed the two main logistics challenges in Mexico—government policy and logistics infrastructure—in detail, there are several other characteristics of the Mexican logistics industry that inhibit international trade. One consistent challenge is the Mexican workforce. The capabilities and training of Mexican truck drivers, in particular, were a major cited reason for the seemingly-perpetual delay of full NAFTA implementation (Harman, 2005). Many organizations experience high employee turnover, sometimes reaching 10 or 15 percent per month (Fawcett et al., 1995). It should be noted, however, that many American and Canadian logistics companies report problems with employee recruitment and retention, especially truck drivers. In our discussions with several large Mexican logistics companies, they reported difficulty in recruiting quality employees at every level from managers to line workers. We were able to identify ten Mexican universities that offer degree programs in logistics and/or transportation, but it is clear that there are not yet enough graduates to fill the need in the industry.

In recent years, many organizations in the United States, Canada, and Western Europe have delegated many or all of their logistics operations called *third-party logistics providers* (3PL). The main reason for this is the organization’s classic desire to focus on its core competencies and let so-called experts handle the rest of the operations. The advent of advanced communications and systems technologies have made it even easier for these organizations to transmit the necessary information to their 3PL, which may be located in another part of the world. The United States’ 3PL industry has been remarkably successful, posting a 14 percent average annual growth rate and exceeding US\$100 billion in revenue in 2005 (Quinn, 2006). Many of these 3PL providers have expanded their service portfolio beyond traditional logistics operations to value-added activities such as product labeling and repair operations for warranty claims.

A recent survey of Mexican manufacturers about their experiences with the 3PL industry found that fewer Mexican companies are using 3PLs than those in the United States and Europe; this difference is even more exaggerated among small- and medium-sized companies. The study also found that those companies that are using 3PLs are focusing on more routine activities such as customs clearance and freight bill auditing and payment. This is in contrast with American and European firms that use 3PLs for these services as well as more integrated functions such as inventory management or warehousing. Mexican companies also focused less on cost reduction than they did on improved flexibility and customer service; American and European companies’ first goal from a 3PL relationship is cost reduction (Arroyo et al., 2006). While there certainly is a degree of world-class expertise among 3PL providers in Mexico, the relative underutilization of this expertise by Mexican firms as a whole leads to a less efficient logistics system.

CONCLUSIONS AND FURTHER RESEARCH

If Mexico wants to capitalize on the wave of globalization that is currently flowing through nearly every industry, private and public entities must address the logistics challenges that have been perpetuated by the government’s regulations and the country’s inferior infrastructure. This paper has highlighted these challenges and has attempted to provide several recommendations for solidifying Mexico’s position as an influential player in the global business environment.

It is also our hope that the issues raised in this paper encourage other researchers to conduct further academic studies in this area. In our review of the academic literature on Mexican logistics, we were very surprised to find a dearth of studies, especially after the years immediately following the approval of the NAFTA agreement. All of North America can benefit from a stronger Mexican economy, and hopefully the logistics community of academics can do its part to help Mexico match its NAFTA partners.

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