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# INTERMODAL TRANSPORTATION SYSTEM FOR ASIAN GOODS TO U.S. VIA MEXICO: AN ANALYSIS

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## Introduction

U.S. shares more than 2000 miles of international border with Mexico. In Fig. 1 we present the major border ports on either side of the U.S. Mexico border and it can be seen that Texas has more number of border crossing ports than any other state in the U.S.

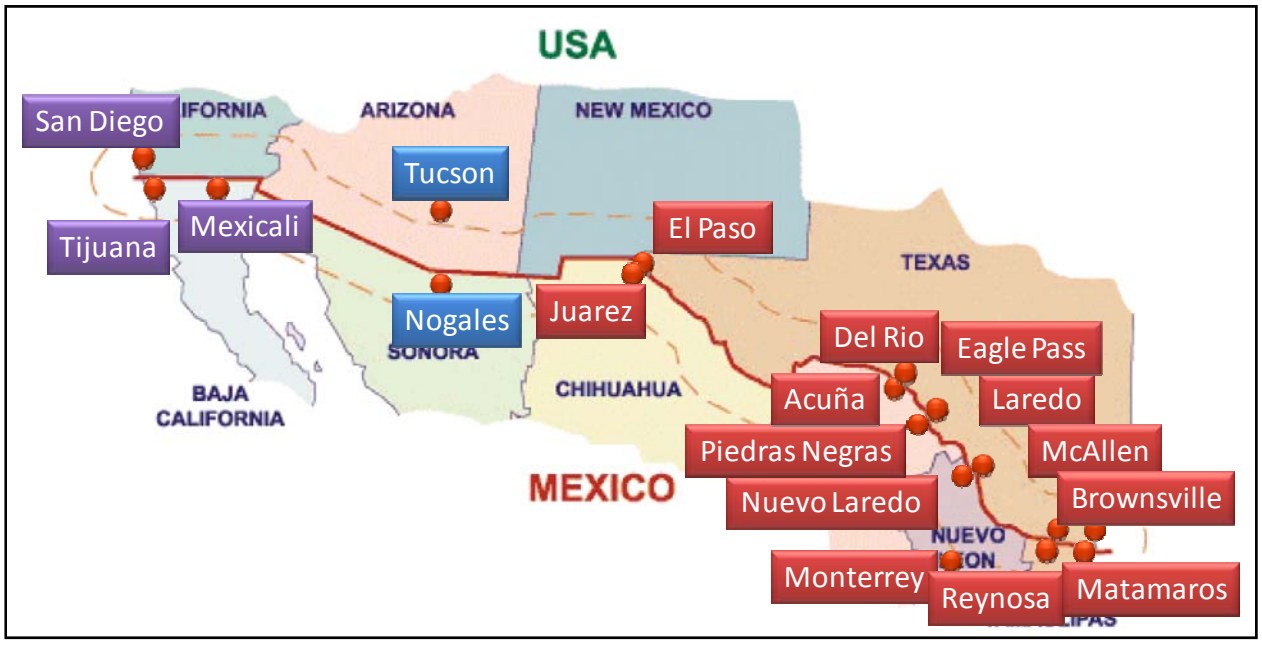


Fig. 1 : Major port of entries along U.S. Mexico

## Trade Data

The total trade along these major crossing points is presented below in Fig. 2 which indicates a 33% increase in amount of trade along these ports during a period of four years from 2003 to 2007. At the same time Fig. 3 shows the amount of trade along the U.S.-West coast ports of Los Angeles, Long Beach, and Seattle have dropped or reached a saturation point. These data prove the significance of the trade route through Texas.

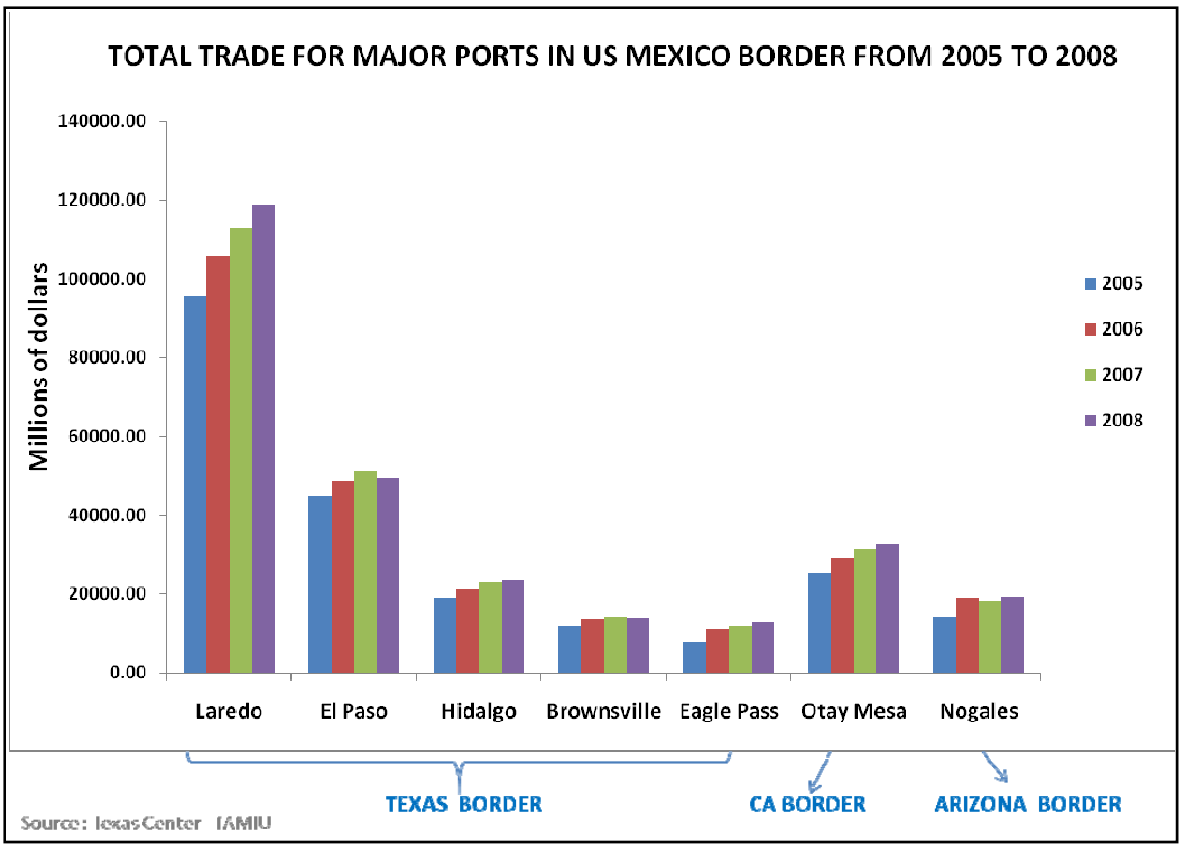


Fig. 2 : Trade data for major ports in U.S. Mexico border

The transit time for the goods to reach the U.S. west coast from Asia is around 12.3 days and the west coast alone handles 75% of the goods from Asia [1] . The major ports of entries to the U.S. in the west coast are Los Angeles/ Long Beach ports. Due to increase in the volume of imports these ports are facing challenges in handling the goods. It is predicted that by 2020 these ports would receive around 40 million containers [6]. This would increase the lead time, transportation cost and lead to congestion in the highways in the state of California. The problem can be solved if other ports in the west share a portion of the total imports. The ports along the west coast of Mexico are capable to handle the imports from Asia. It is highly essential to analyze the advantages of these ports and their intermodal capabilities to handle the increased volume of imports.

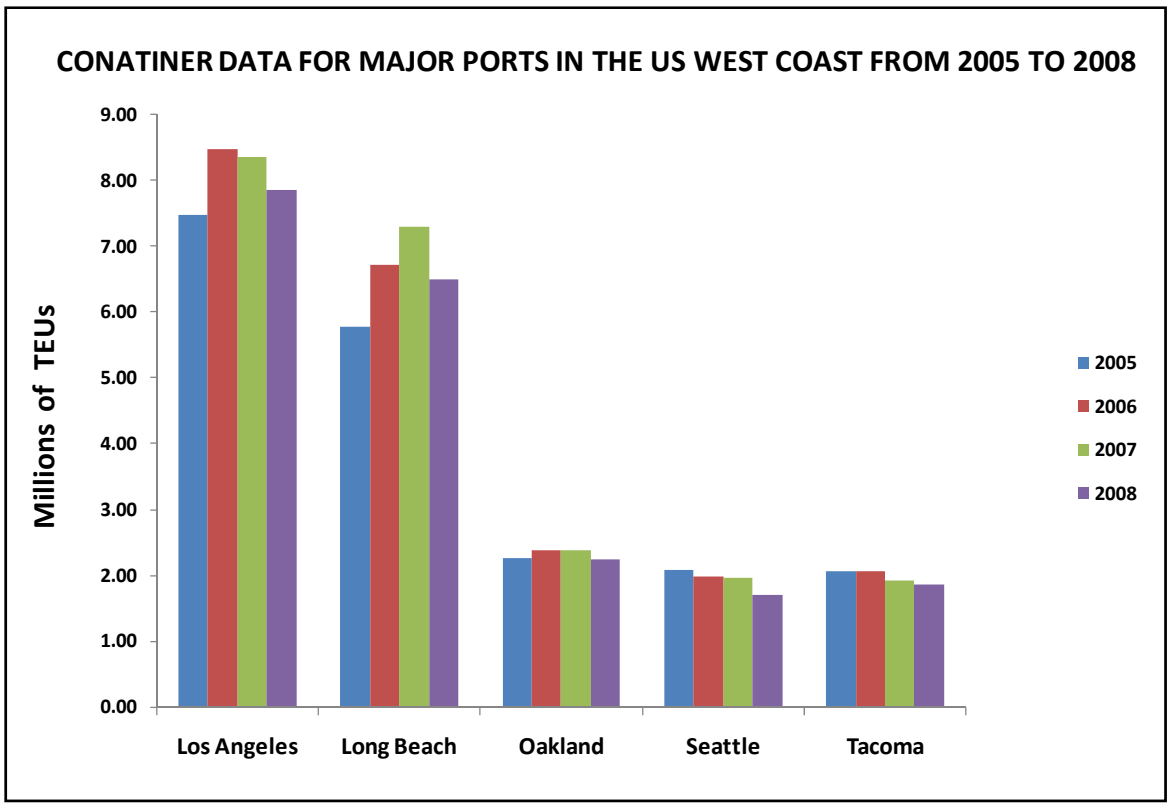


Fig. 3 : Trade data for major ports in U.S. West Coast

Mexico, the NAFTA partner of the U.S. is one of its major trading partners and in terms of trade with the U.S. it is currently ranked third behind Canada and China. The U.S. imports constitute 60% of the total trade between the nations and Mexico accounts for the rest of the imports, roughly an even split between the two trading partners. Part of the goods from China bound to the U.S. is shipped to Mexico and then by road/rail they reach the U.S. Out of this, three fourth of the goods coming from Mexico reach the U.S. border by trucks [1]. Almost 65% of this trade takes place via the land routes [1] and since 2003, the number of commercial containers passing through the U.S.-Mexico border has increased by almost 20% as shown below in Fig. 4. The amount of truck tonnage flowing through Texas is expected to increase from 1.2 billion in 1998 to 2.4 billion in 2020 [2].

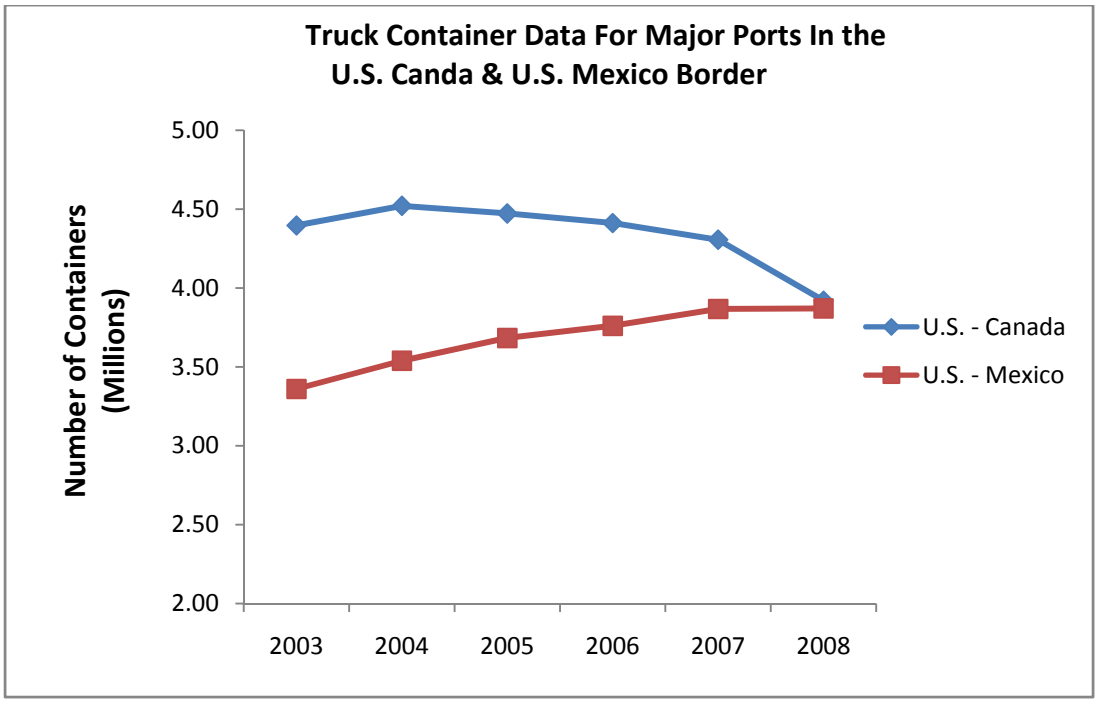


Fig. 4 : Truck container data

Below we analyze the logistical infrastructure such as road, rail and sea in U.S. Mexico trade and the intermodal capabilities.

**Road infrastructure:**

The estimated daily truck flow along U.S.-Mexico border clearly shows the choke points in the region. The amount of truck tonnage flowing through Texas is expected to increase from 1.2 billion in 1998 to 2.4 billion in 2020 [2]. This projection unambiguously underscores the need for infrastructure investment in this region. Some of the infrastructure plans in this region still in the active stage include the I 69 corridor [3] (current status: Environmental Impact study), Ports to Plain corridor [3] (Laredo portion almost complete) and the La entrada al pacific [3] (Current status: Feasibility study). The Texas Trans corridor was also one of the major infrastructure initiatives for this region, but it was later dropped during the Fourth Annual Texas Transportation Forum held in January 2009 in Austin, Texas [3].

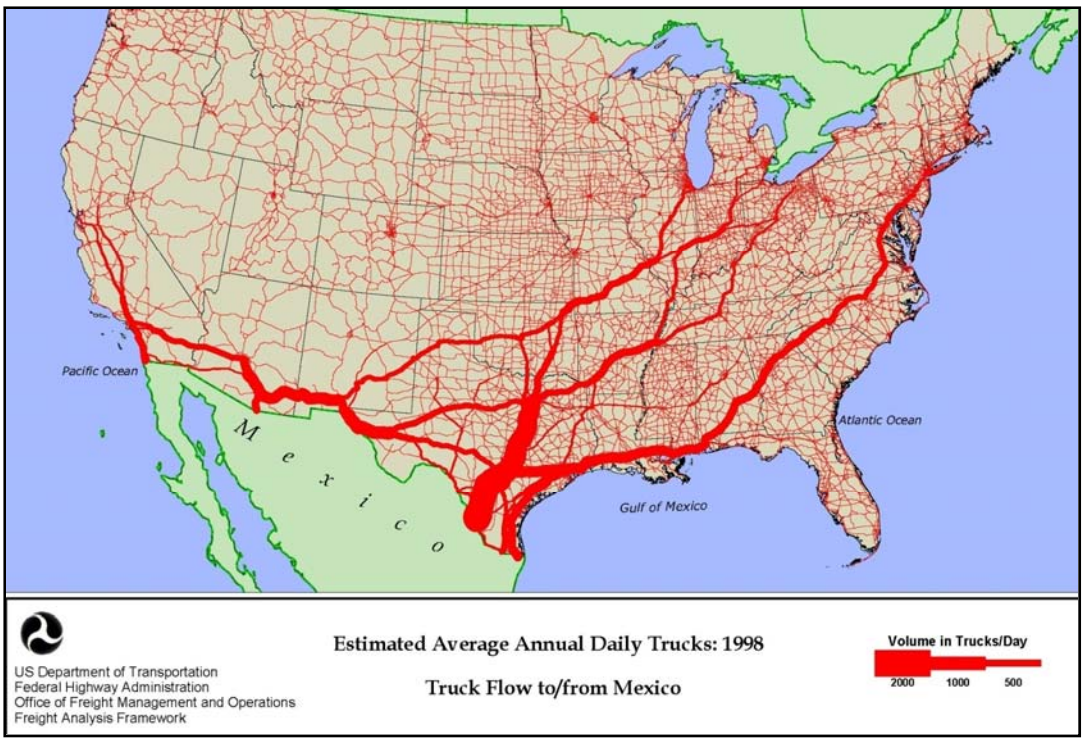


Fig. 5: Truck Flow data U.S. Mexico

The Mexican government also realizes the importance of road network in their country and is currently developing 14 high priority corridors through public private partnerships. These highway corridors link the major sea ports in Mexico with the interior part of the country and the towns along the U.S.-Mexico borders.

**Technical evaluation of Regional Logistical Infrastructure**

**Highway corridor 2012:**

The Government of Mexico had come up with several initiatives for improving infrastructure in the country, one such initiative is the National Infrastructure Program [7].

As a part of the National Infrastructure Program (NIP), the Government of Mexico proposed the highway development project 2012. This National highway corridor is a part of the Mexican Federal road network which was initiated to improve the highway infrastructure in the country.

There are 14 main corridors covering a distance of around 11547 miles [8], which run along the length and breadth of the country as shown in Fig. 6 below:

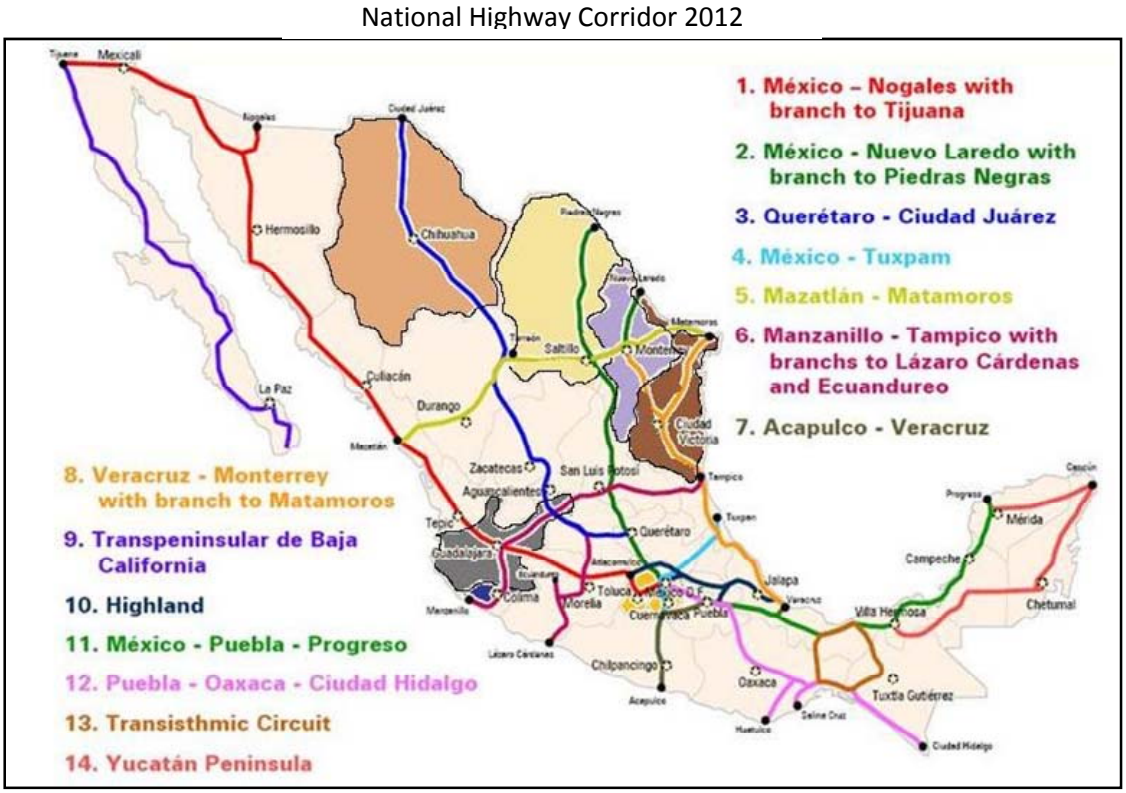


Fig. 6: National Highway Corridor in Mexico

**Ranking the Highway Corridor road networks:**

As of late 2009, because of the lack of funding, this NIP is put on hold. The infrastructure projects would start when the economy is back in track, at that time it would be prudent for the Mexican government to concentrate on the most important corridors, rather than the entire 14 corridors. We look at these proposed 14 corridors and evaluate them on their importance. Each of these 14 road networks was ranked to understand the importance of growth of the trade between Texas and Mexico. The ranking is based on the total value of imports from Texas to each state in Mexico. It is found that 90% of the total imports from Texas goes to these 6 states; Chihuahua, Tamaulipas, Estado de Mexico, Distrito Federal, Coahuila, Nuevo Leon and Jalisco [1]. The states through which the roads in the highway project pass through are then identified. This is done to each of the 14 road networks in the National highway corridor. The value of

goods each state in Mexico imports from Texas is divided by the total value of goods that flow southbound from Texas to Mexico to get the percentage of imports for each Mexican state. Then for each road network the total percentage of goods flowing through them is found by adding the values from the individual states in that network. The roads are then ranked based on the percentage of the total amount of goods each state imports from Texas. The top 6 road networks as per the above ranking methodology are shown in the Fig. 7 below.


Fig. 7: National Highway Corridor 2012 – top 6 road networks

The map shows that 37.6% of the southbound goods from Texas travel through the road originating at Nuevo Laredo and ending in the state of Mexico with a branch to Piedras Negras; making it the most important route in this trade corridor. This route covers the states of Coahuila, Nuevo Leon, San Luis Potosi, Guanajuato, Querétaro, Estado De Mexico, and Distrito Federal. There are 67 industrial parks operating in these states, which constitutes to around 38% of the total number of industrial parks in Mexico.

**An example of state initiatives towards infrastructure development**

Apart from the federal initiatives, the state governments also have funded highway projects. One among them is the State of Nuevo Leon's Colombia-Monterrey highway project shown in Fig. 8. The proposed highway when completed will reduce the travel time between these two cities by 2 hours. This will help to increase the flow of commercial vehicles through the Colombia Solidarity Bridge; easing the border crossing process at Laredo by reducing the number of trucks passing through the World Trade Bridge. In the current state, the World Trade Bridge is congested because of the bulk (75%) of 12,000 trucks crossing into Laredo goes through this bridge, whereas the Columbia Solidarity Bridge is operating at 25% capacity.

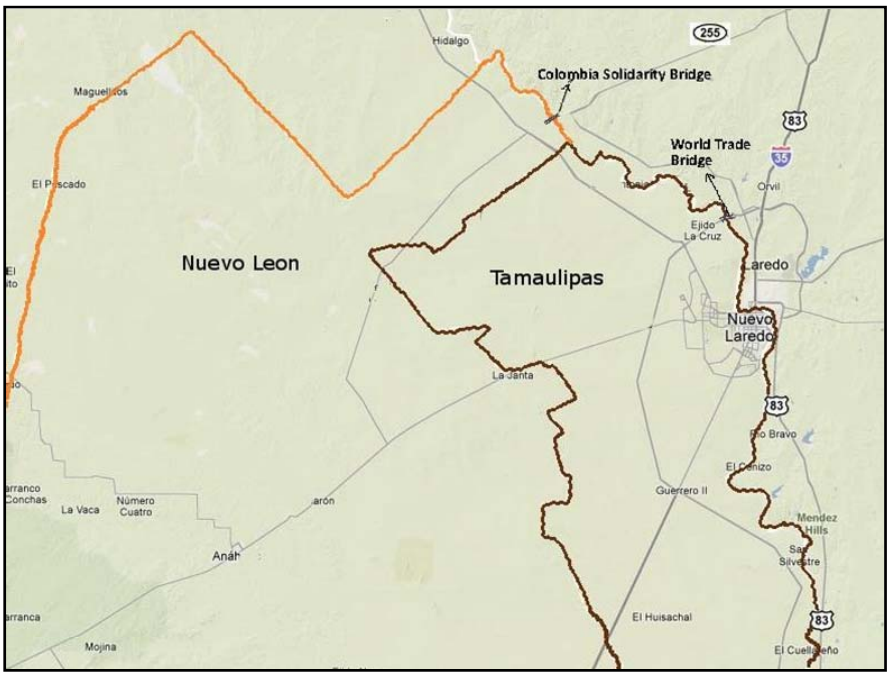


Fig. 8: Initiatives by State Government

Investments in infrastructure are essential to improve the trade between Texas and Mexico. In Mexico 53% of the weight is transported by road, prior to 2006 the Mexican government invested only 2% of its GDP for road infrastructure. In the last few years, the Mexican Government has been making huge investments in construction, maintenance and modernization of roads in the country. The recent global economic downturn has forced Mexico to put a temporary hold on the national highway corridor project.

**Rail infrastructure:**

The railroad is the second most preferred mode of transportation along this region. The rail network in Mexico has seen a 100% increase in goods movement since NAFTA inception. Since mid 1990s most of the railroads in Mexico were privatized, and now there are three major rail networks in the country, namely Kansas City Southern Mexico (a wholly owned subsidiary of Kansas City Southern (KCS)), FerroMex (partly owned by Union Pacific (UP)) and FerroSur. The areas they cover in Mexico are presented in the following figure. FerroMex and KCSM have started investing heavily in the rail roads, multimodal corridors and new terminals since privatization. Especially KCSM, has set up an intermodal terminals at Lazaro Cardenas , and are marketing the idea of bringing the goods from Asian region to interior United States through their rail network. The major rail network is shown in Fig 9.


Fig. 9: Major Rail Network in Mexico

On the U.S. side the major rail network players are Union Pacific (UP) and Kansas City Southern (KCS). UP have terminals at Laredo, El Paso, Eagle Pass and Brownsville, and KCS has terminals at Laredo and Brownsville. BNSF is the other major player in this sector but they

operate only by trackage rights along the Texas-Mexico border. Both UP and KCS are strategically investing and upgrading the bridges along these border towns, but the developments are not dramatic as we have seen in the Mexican side.

**Sea Ports**

The portion of direct trade between U.S. and Mexico through sea ports is limited, but that doesn't preclude the importance of these ports in this region. The sea ports under consideration include Lazaro Cardenas, Altamira, Tampico, Veracruz, Mazatlan and Topolobampo in Mexico and Port of Brownsville, Port of Corpus Christi and Port of Houston in Texas. Shown in Fig.10. The goods that come through these are either consumed in the respective countries or shipped as raw materials or transformed products (part of the finished products) across the border. We are more interested in investigating the latter part of the trade.

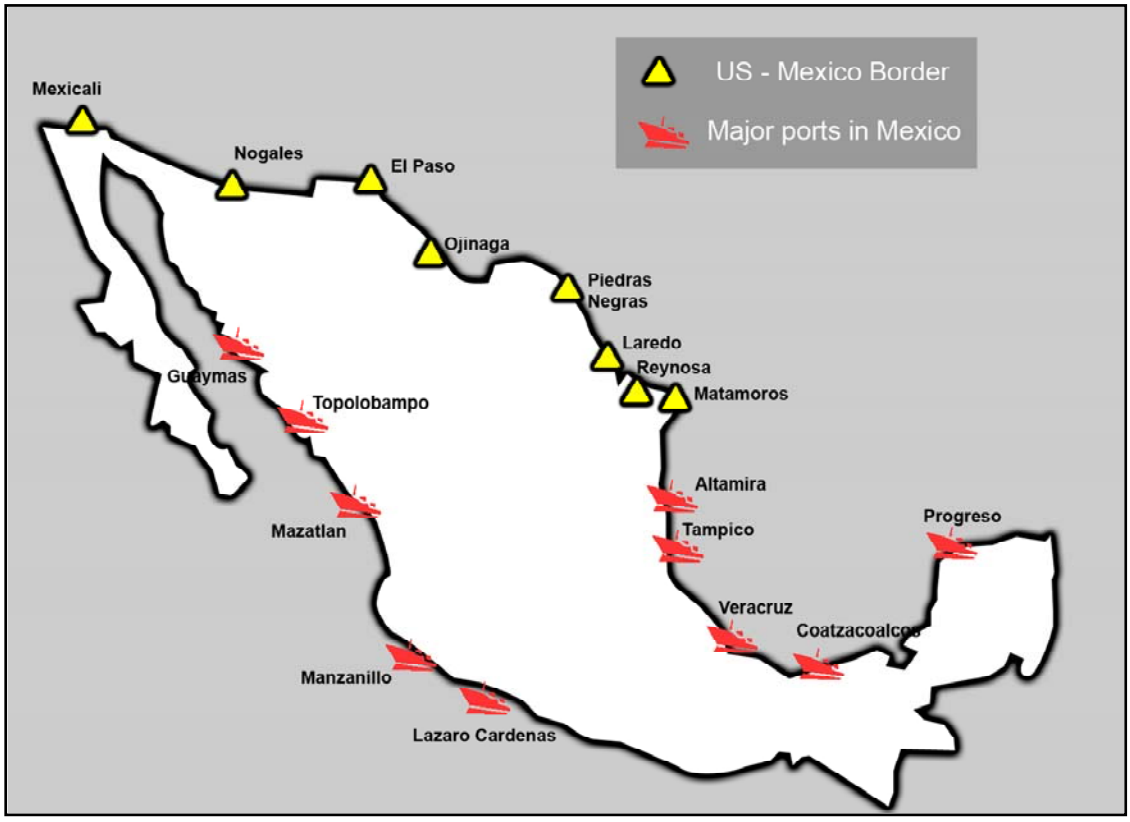


Fig. 10: Major Sea Ports in Mexico

With increasing congestion along the western ports in U.S., several logistics providers are looking at Mexican ports like Lazaro Cardenas to relive the pressure by bring the goods to interior of U.S. through Mexico. The major Mexican inbound ports of interest in the Pacific coast are Lazaro Cardenas, Manzanillo and the project to build a new port at Punta Colonet (currently the project is under hold). The seaports along the Texas region are also serving as inbound ports to Mexico and conduit to traffic flowing to Europe. However the effect of widening Panama Canal would bring about a new dimension in the trade between Asia and the U.S., whereby the impact of these ports in the region would be undermined.

**Product/ Commodities Traded**

The top commodities traded between the two countries for a period of four years from 2003 to 2007 is depicted in the following figures. Automotive sector, minerals and machinery seem to be some of the dominant commodity traded between the NAFTA partners [4] & [5]. U.S. import a lot of energy products and electronics such as household appliances, whereas they export cloths, chemicals, metals, paper and computer equipments. The top commodities traded between U.S. Mexico and U.S. China are presented in the Fig. 11 and Fig. 12.

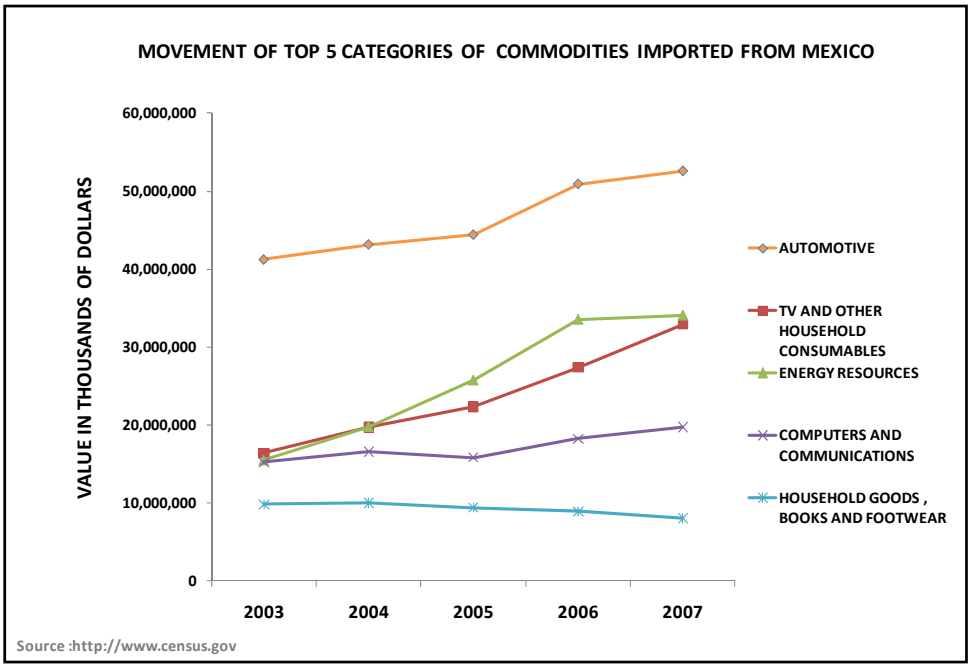


Fig. 11: Major Commodities imported from Mexico

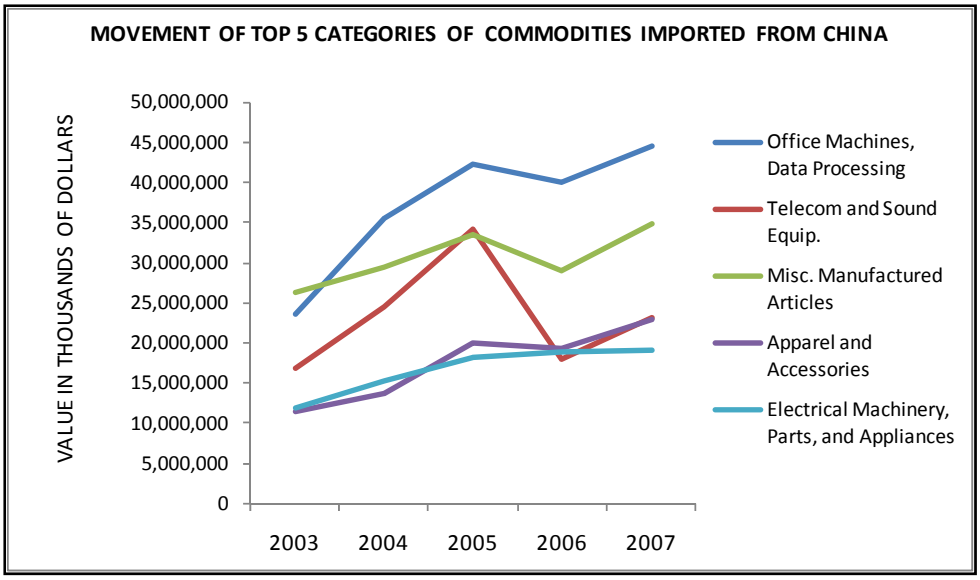


Fig. 12: Major Commodities imported from China

**Intermodal Facilities**

The rapid increase in the trade has resulted in increased flow of goods in Mexico. In the last few years there has been a huge growth in the traffic of goods in Mexico whose final destination is U.S. So far we had seen the logistical infrastructure capabilities in Mexico. We now look at some of the intermodal facilities in Mexico.

Although Mexico has seen an increase in the goods movement by railroad since the inception of NAFTA, there is lot of potential for further increase in rail traffic. The three major rail networks discussed earlier are in the process of continuously expanding the intermodal terminals. Mexico has 64 intermodal rail terminals and the it has been targeted to increase the rail road transportation in Mexico by 18-20 percent by 2012. [9].

Some of the major intermodal terminals in Mexico operated through the rail network of Kansas City Southern Mexico (KSCM) are Contrimodal, El Cayacal, Encantada, Lazaro Cardenas, LIT terminal, logistics terminal, multimodal Amigo, Pantaco Mexico City, Port Altamira, Puerta Mexico, Queretaro, Rojas Ramp, Salinas Victoria, San Luis Potosi, Silao and Veracruz.[10]

The major sea ports in Mexico, especially the ports in the west coast, Lazaro Cardenas, Manzanillo, Guaymas, and Topolobampo are expanding their container terminals and building

additional facilities. These ports would play a major role in offering an alternative to the congested ports of Los Angeles / Long Beach in U.S.

The National Infrastructure Plan (NIP) in Mexico has initiatives for development and modernization of sea ports, construction and modernization of highways and rail network in the country. There are also initiatives to develop 10 new multimodal corridors and construction of 12 new intermodal terminals.[9] These developments have increased the demand for equipment and services for intermodal transportation. It should however be noted that few of these projects are under hold due to the present economic downturn.

**Future Scopes for Intermodal facilities**

The goods after reaching the U.S. border are distributed to various locations located across the U.S. The top 12 states in the U.S. that trade with Mexico and the value of their imports in 2008 is given in the Table 1 below.

Table 1 : Imports from Mexico to U.S. states in Millions of $

It can be clearly seen from the above table that except for Texas and California all other states are located either in the north eastern, south eastern or north central regions. These states are better accessed from the port along the east coast. Then why most of the imports from Asia reach the west coast of the U.S. or Mexico?

Ideally the goods whose final destination is near the eastern coast of the U.S. should enter the U.S. through the ports in the east coast. But the constraint on the width of the Panama Canal

prevents large ships from entering the canal and reaches the sea ports located along the east coast. The Panama Canal widening project is expected to be completed by the mid of 2010, once the canal is widened, the goods from Asian countries can be shipped directly to the ports along the east coast of the U.S.

**Sea Bridge Freight:**

With the congestion in the land ports in Texas, road infrastructure projects dropped and the widening of Panama Canal yet to be completed, the initiative by Sea Bridge Freight provides a much needed access between Texas, Mexico and the Eastern United States. The Sea Bridge Freight connects the Port of Brownsville in Texas with Port Manatee in Florida which is shown in the Fig. 13.


Fig. 13 : Sea Bridge

**Port of Brownsville:**

The Port of Brownsville is located at the southernmost tip of Texas at the end of a 17 mile channel that meets the Gulf of Mexico at the Brazos Santiago Pass. The port provides services to facilitate the international movement of goods between Mexico and the United States. At the Port of Brownsville, the land transportation of Mexico is linked with the Inland Waterway System of the United States. The port is a major center of industrial development with over 230 companies doing business there. The major commodities traded in the port of Brownsville are

chemicals, LPG, clays, petroleum, grain, agricultural products, sulfur, steel, bulk minerals, ores, fertilizers and aluminium.

**Port of Manatee:**

Port Manatee, one of the largest ports in Florida is located on the Tampa Bay and is the closest U.S. deepwater seaport to the Panama Canal. The port provides intermodal connectivity and it offers thousands of acres of vacant land available for growth and development. The port has good highway and interstate connections with access to Interstate 75 and Interstate 275. The major commodities traded are fresh produce, forestry products, petroleum products, citrus juice products, fertilizer, steel, aluminum, automobiles and cement.

**Market opportunities:**

There is no single rail network in the U.S. that connects the east and the west, the Sea Bridge Freight offers a unique alternative for the transportation of goods to the east coast of the U.S. which benefits these two large growing markets of Mexico/South Texas and the Southeast/Eastern seaboard. The major customers who are benefitted in this chain include the third party logistics companies (3PLs), intermodal carriers, customs brokers and the manufacturing companies.

The dominant market in this network is the movement of goods from south Texas/Mexico to the port of Manatee. The major commodities that flow through include steel, tile, manufactured products and beverages. There is also a significant flow of goods that are transported back through the ships to the port of Brownsville. The commodities that top the goods flowing in this direction are paper, base raw materials and chemicals.

Fig. 14 : Operations at Port of Brownsville and Port Manatee

**Operations and benefits:**

The Sea Bridge Freight operates a round trip voyage every 10 days; it takes 3.5 to 4 days transit time to complete the voyage on a single way. The loading and unloading operations at these ports take around 8 to 12 hours from the time the vessel reaches the port. The ships are large enough to handle 450 TEUs which is approximately equal to 225 truck loads which makes it an efficient transportation mode providing lowest cost per unit. Moreover the transit times are more reliable when compared to the trucks that are usually subjected to fluctuations due to various factors. A single way transport by a ship in this route offsets nearly 400,000 truck miles for the equivalent number of trucks. This also avoids the traffic explosion in the Texas border and reduces the pollution levels in this region.

**Cost savings and Environmental Safety:**

With reduced fuel consumption in these times of increasing fuel prices, there is a significant savings observed by the intermodal carriers which in turn reflects as savings to the end customers. For the same volume of goods transported in this sea route when compared to that of land route, there is a fuel saving of 40,000 gallons per round trip. This also naturally makes the Sea Bridge Freight to be environmentally friendlier by reducing the emission levels. On a single way shipment the Sea Bridge Freight barge eliminates over 750 thousand pounds of air emissions when compared to an equivalent number of truckloads.

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# CHALLENGES FACING SUPPLY CHAINS THROUGH PORTS OF LOS ANGELES/ LONG BEACH

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## Abstract

With the increase in U.S. trade with Asian countries, ports in the western United States are becoming busier. The ports of Los Angeles/Long Beach, major port in California, handle the majority of the imports and exports of the United States. This research looks at the current situation of the Ports of Los Angeles/Long Beach. We look at port capabilities and list some challenges to efficient port operations due to the rapid growth. Some of the major challenges are port congestion, labor and capacity restriction. We also look at alternate options of bringing Asian goods into the United States.

## Introduction

Increased importance and demand of importing goods from Asia are posing challenges to the resource capabilities in the Ports of Los Angeles/Long Beach. These ports have been the major ports of entry for imported goods into the U.S. from around the world. With the increased imports, these ports are almost operating at capacity. This is causing inefficiencies in terms of congestion, long lead times etc. This situation needs to analyzed now when the imports into the U.S. are increasing at a fast pace.

To analyze the current challenges being faced by the ports of Los Angeles and Long Beach, information on various factors such as distance and time involved in bringing the goods from the origin to the U.S. port of entry, various steps in the transloading process, estimates on waiting

time, transloading time and customs clearance time, intermodal transportation capabilities, distance and time in shipping goods to their destinations, processing of unfinished products are required. The complex interaction between these factors makes this an intricate and interesting study.

Los Angeles/Long Beach ports are facing problems relating to overburdened capacity in terms of equipment and labor, which leads to increased waiting times, road traffic, rail congestion, etc. The focus of our research is to evaluate the present situation, identify main factors contributing the issues and suggest alternate methods of bringing in goods into the United States. These, when deployed, will improve overall operating efficiency and also provide enormous benefits to industries that are using ports of Los Angeles/Long Beach to bring in their cargo.

Information for this study is collected through personal interviews with Port personnel. Additional statistical information is obtained from books and other internet sources. The effect of these challenges on the overall trade and logistics efficiency of companies will be discussed. This research will help in identifying the opportunities for ports of Los Angeles/Long Beach. Additionally, it also provides a list of capabilities that can be obtained through alternative configurations of supply chains. With the magnitude of overseas trade these days, a marginal improvement that can result from analyzing the Ports of Los Angeles/Long Beach can provide huge benefits.

**Increased Importance for Imports**

Imports are increasing from the last 35 years, especially from the countries like China. The total increase in imports from 1994 to 2007 is 193.1% and from the year 2006 to 2007 is 5.3%, from China in particular is 12.2%. 2008 statistics of goods imported is $177.7 billion. US imports in TEUs is more than 11 million. And it mainly constitutes Petroleum products, Food and beverages and electronics. Apart from China, EU and Mexico are some of the fast growing import partners.

According to the U.S. Census Bureau, the change in imports of goods from October 2007 to October 2008 reflected increases in industrial supplies and materials ($10.0 billion); consumer goods ($0.7 billion); foods, feeds, and beverages ($0.8 billion); and other goods ($0.2 billion). A decrease occurred in automotive vehicles, parts, and engines ($4.6 billion). The growth rate has slowed somewhat, but it's still significant. According to data from PIERS Global Intelligence Solutions, the port of Los Angeles, for example, saw 18 percent growth in containerized traffic through November 2006 (Quinn 2007). The future imports will be more demanding and because of this growing importance of imports it is worthwhile to study the present scenario.

## Current Situation

The Ports of Los Angeles and Long Beach are first and second in the nation, respectively in container volumes, and together they handle more than one third of all full international container traffic in the United States. Full international container traffic at the ports was 9.2 million Twenty-Foot Equivalent Units (TEUs) in 2005, including 2.0 million TEU of export traffic and 7.2 million of import traffic. The ports accounted for 24.2% of all U.S. export container traffic and 40.6% of import container traffic in 2005. China is the most important trading partner and the major products in import are Petroleum, Electronics and Plastics. Though trading in US includes both imports and exports, the effect of imports is so high that it sometimes makes the effect of exports less pronounced. The TEU statistics (imports and exports) of containerized traffic in LA port has increased 12.42% from 1980 to 2006. The present statistics of 2007 is about 8.4 million TEUs.

The time taken for the loading and unloading operations is lead time, which is an important factor to be considered. The stages of operations after the ship reaches the port briefly are the off-loading/loading process : the ships typically “hotel” or stay at the terminal for approximately 36 hours, or 1.5 days, but the largest ships may stay as long as three days. Cargo is received and delivered through the truck gates and the on-dock rail yard. Wharf gantry cranes are used to move containers on and off ships.

A single container ship may unload 6500 TEUs in an average, where one 20-foot container is equivalent to 1 TEU, a 40-foot container is equivalent to 2 TEU’s. Typically, cranes can transfer 25 to 40 containers per hour. The number of cranes operating simultaneously on one ship can vary from one to ten, depending upon the size of the ship, the number of vessels at berth, crane

gauge (distance between crane legs), and the availability of cranes. Based on this information a medium sized ship takes above 20 hours to completely unload the ship.

Containers that are stored in terminal backlands are either stacked upon one another or stored on a trailer and then parked. These containers are then delivered outside the Port boundaries by various combinations of truck or rail transit. Prior to July 2005 the ports of Los Angeles and Long Beach tariffs provide five free days for import containers on the terminals but now it is four days for imports.

After this, the goods are to be transferred to their destination centers. This is done by intermodal transportation. Rail and road transport are the major constituents of intermodal transportation and their effective utilization is important. Any cargo that is moved by train from the Port benefits the overall transportation system by reducing the truck trips and total truck mileage with the associated impacts. In average each on-dock train can eliminate 750 truck trips and are at least twice as fuel efficient and clean as trucks on a ton-mile basis. A single container ship may unload 5,000 twenty-foot equivalent units (TEU) to be delivered outside the Port boundaries by a fleet of trucks. On-dock rail can potentially eliminate 3,750 truck trips for every vessel call. The Railways present in the port terminal are Intermodal container traffic facility (ICTF): a near dock rail road**,** On dock rail yards: APL rail yard, Maersk, Evergreen/NYK, Yang Ming/China Shipping Rail yard and Alameda Corridor.

## Current Challenges

The challenges that the ports of LA/LB are facing are categorized broadly and each one of it addressed below.

### Capacity constraints of the port

Capacity constraints threaten to act as bottlenecks to trade growth. Increased imports are to be met by the port facilities like, material handling equipments, storage and ware housing facilities. Material handling equipment like cranes, etc has great effect on the lead times. Lead times though are reduced since the past years; it is possible that this gets saturated, thereby increasing the time taken to load and unload the ships.

Port expansion is the major challenge the LA/LB ports are working at. The ports' long-term development program began in the mid-1980s and extends to the year 2020. Since 1991, however, the two ports have pursued different expansion strategies. Long Beach is redeveloping existing properties, such as the Navy station and former Wilmington oil field (Erie, Brackman, and Rauch 1996).

The volume of trade flowing through these ports has surged in recent years and is expected to at least triple over the next twenty years, but only if the port have adequate trade infrastructure capacity. However, Southern California is rapidly running out of trade infrastructure capacity (Kyser, undated). Intermodal rail yards are close to capacity already; and freight railways will see significant goods movement delays within five years. Highway congestion, already legendary, will only worsen.

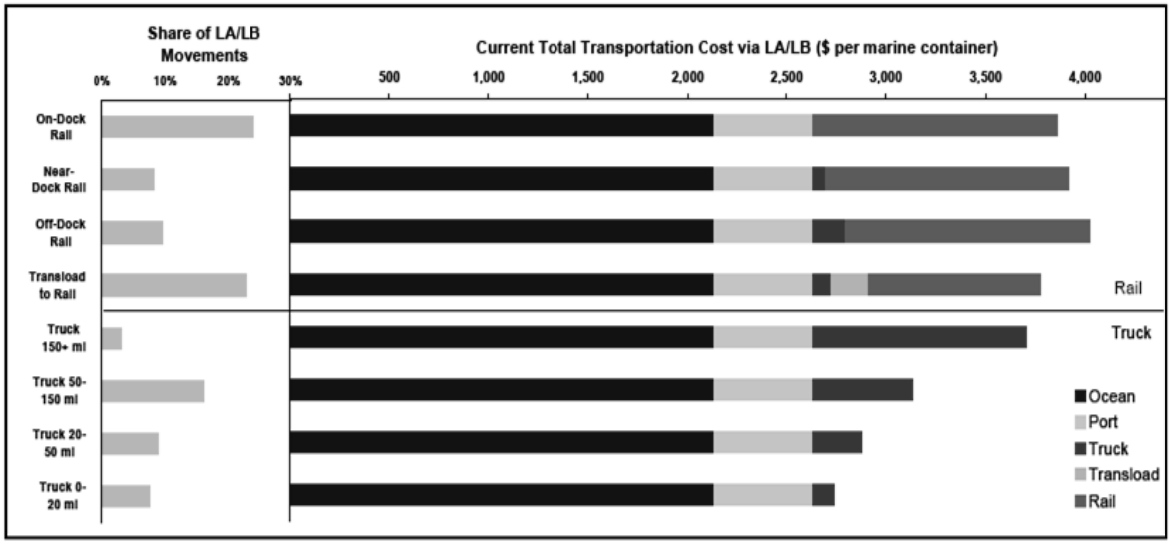
**Traffic congestion at the port**

As tariffs and other political barriers to trade continue to shrink or disappear, the ability to transport goods efficiently has become an increasingly important consideration in international trade. Firms rely on fast, flexible, and reliable shipping to link far-flung plants, and transportation breakdowns and congestion can idle entire global production networks. As a result, the capacity and efficiency of seaports, airports, and multimodal linkages have become critical factors in global trade.

Congestion caused before unloading is due to insufficient on-dock capacities at the port. Increased container traffic leads to waiting time before the ship reaches the dock thereby increasing the lead times. This also increases the total transportation costs.

**Intermodal Transportation**

Congestion during Intermodal Transportation is the major challenge faced by cities like Los Angeles. After the goods are unloaded then the process of intermodal transportation starts. The increase in the importance of co-operation between different modes of transport like, air, water, rail, road, is required (Siggerud 2006).




The figure above (BST Associated 2007) shows the relative costs constituting intermodal transportation in LA/LB ports.

In Los Angeles, there is an active movement to encourage the delivery of cargo from the ports to inland distribution centers at all hours of the day rather than concentrating them in the highly congested daylight hours (Henton et al. 2006). In spite of these measures Intermodal Transportation still remains as a challenge to the smooth operations of the port.

There is some evidence that California's global gateways, airports in particular, are not keeping pace with the growing demand for shipping services. Although these ports have seen a growth in the value of trade in the latter half of the 1990s, their share of the total trade in US reduced from 38 percent to 21 percent between 1995 and 2002(Haveman, Hummels 2004). The report by the Mercator Transport group shows that over half of this decline was due to shippers' preferences for other gateways.

**Environmental factors**

Increasing the traffic increases the pollution and finding cleaner and most efficient transportation is necessary. Rail transport is better than road transport in this aspect as it causes relatively less pollution and lower traffic problems, but it lacks flexibility of road transportation.

Though the port of LA is developing strategies to control pollution like Clean Truck Program, etc, this still remains as a problem. Recent fees imposed on every container moving through the

ports of LA/LB by the lawmakers in California, with the sayings “California children shouldn’t breathe soot so people across the country can buy cheap televisions” show the severity of the problem.

**Labor costs**

Another important part of the overall cost of transportation is the labor costs. US have a comparatively higher labor costs. Labor costs arises not only in the operations in the port, but also the finishing operations which may be required for certain imported goods like petroleum, plastics, electronics, etc. Also the labor unions pose a great challenge to the port, the execution of clean truck program for example faced friction with the labor unions.

**Destination Centers**

The places of destination are the main consideration of supply chain logistics. The port of Los Angeles suffers the drawback of not so optimal distributer in terms of distances from the port to destination in different part of US. Much of the trade passing through California’s global gateways either originates in or is destined for use in other states. In 2000, for example, California serviced $297 billion in trade for other states.

## Conclusion

The continuous increase of port congestion in the San Pedro Bay is pushing every day more importers to relocate the port of entry of their goods. The solutions for these problems include new development projects, and the mundane but effective approach of making more productive use of existing space and capabilities. Making the most of what they already have has allowed a number of ports to increase existing container capacity and to cut back the amount of time containers remain at dockside. Key to augmenting container-stacking density is more powerful loading equipment.

Ports near the Destination Centers can improve the efficiency of transportation; also the economy prevailing at these ports can be utilized. Also that, imports from Asia are expected to continue to grow at a significant rate and since areas of extension are rare in the San Pedro Bay, a relocation decision seems to be inevitable.

The possible alternate ports can be identified according to the following requirements:
1. Sea transportation, taking into account the effects of the shipping lines available at the port.

2. Port and area infrastructure, which assess the facilities and services required.
3. Lead-time, from China (major importer for these ports) to terminal dispatch.
4. Labor costs etc.

Three different areas where the imports can enter the continent are the Northwest Coast, the secondary ports of California, and Mexico. In California, being fairly close to Los Angeles-Long Beach ports, Oakland and San Diego are natural alternatives to be considered. The switching costs may be smaller than relocating to the Northwest, and the move relatively easy. But, Mexican ports are increasingly being considered as real alternatives to Los Angeles port congestion. Still a relatively small port, Ensenada is expected to grow significantly, being "at the door" of the United States. The largest Mexican Pacific port, Manzanillo, although being further provides good equipment and services. Mexican ports have many potential advantages like, lower transportation costs, lower labor costs, efficient intermodal transportation, etc.

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