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Ocean Transport of Containerized Liner Cargo in the United States-Mexico Trade

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OCEAN TRANSPORT OF CONTAINERIZED LINER CARGO IN THE UNITED STATES-MEXICO TRADE

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ABSTRACT

Commerce between the United States and Mexico will continue to grow due to the incremental benefits of the North American Free Trade Agreement. This growth, however, will be slowed at least temporarily by the recent Mexican Peso crisis. Ocean transportation currently only moves about 8.5 percent of US-Mexico cargo by value even though it is the most efficient mode of transport over longer distances. This study hypothesized that the underutilized ocean transport sector has captured significant high-growth general cargo that is amenable to containerized transport from the air and/or trucking and rail sectors of the US-Mexico trade. Historical and ex post facto methodologies were utilized to study the subject. Nationalism, corruption, import substitution policies, intense trucking and rail competition, poor shipper recognition, and the marginal attention given to Mexico's port system have all hindered waterborne commerce in the trade. In 1989, however, Mexico began upgrading its transportation infrastructure in earnest. Market entry by liner operators has been increasing as Mexican ports become more efficient. The hypothesis was accepted. A shift-share analysis revealed specific fast-growth general cargoes with long-term potential for capture by maritime transportation.

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CHAPTER ONE

INTRODUCTION

Trade between the United States and Mexico has been increasing steadily since 1989. Mexico is now the third largest US market following Canada and Japan (Fossey, 1991a, p. 63). With the North American Free Trade Agreement (NAFTA) taking effect, as of January 1, 1994, long-term commerce between Mexico and the US will continue to grow as tariffs and non-tariff barriers are phased out. Nevertheless, it will take at least five to ten years for the true benefits of NAFTA to evolve (Kate, 1992, p. 669).

Many transportation companies anticipate new demand for freight services in the US-Mexico trade based on past cargo trends (Valdes and Crum, 1994, p. 19). In 1989, for example, total US imports from Mexico were valued at over $27 billion; 1989 total US exports to Mexico were worth nearly $25 billion. In 1993, however, total US imports from Mexico were valued at almost $40 billion; total 1993 US exports to Mexico were worth over $41.5 billion. This signifies a 47 percent change in US imports from Mexico by value since 1989 and a 66 percent change in US exports to Mexico by value since 1989 (US Department Of Commerce, 1989; US Department Of Commerce, 1993b; and author's calculations). This growth clearly

indicates that opportunities exist in the US-Mexico market for ocean, air, and land carriers. See US Department Of Transportation (1993b) for a discussion of transport options currently available in the trade.

Steamship lines now have occasion to gain significant market share in a trade historically dominated by trucking. Even though the US-Mexico market has good long-term potential for ocean-liner operators, it is currently experiencing short-term drawbacks. Several events during the past two years are having a negative impact on Mexico's business climate. Between 1993 and 1995, two peasant uprisings in the Mexican State of Chiapas, two high-level political assassinations, and a sudden 39 percent devaluation of the Mexican Peso in December 1994 shook investor confidence in the country (Fossey, 1994d, p. 77; and Hall, 1994q, pp. 1A and 8A). The latter event is having the greatest impact on the transportation industry.

US exports to Mexico grew by 20 percent in 1994, but they are expected to drop to 10 percent in 1995 because of the recessionary pressures now facing Mexico (Memmott, 1995, p. 1B). It is also possible that Mexico may fall into a recession by the second quarter of 1995 (Hall and Johnson, 1995, p. 1A). The significant increase in foreign trade experienced during the Salinas administration is clearly slipping since President Zedillo took office in December 1994. Nevertheless, the US-Mexico market is expected to

continue growing over the long-run due to the incremental effects of NAFTA trade barrier reductions and "...the expected continued growth in purchases of U.S. goods by Mexico-based subsidiaries of U.S. companies. Their purchases account for 25% to 30% of U.S. exports of parts and equipment to Mexico" (Memmott, 1995, p. 1B). Demand for Mexico's exports will likely increase because the peso's devaluation makes its products less expensive to US consumers. Several steamship lines, such as Transportación Marítima Mexicana, are expecting their Mexican export traffic to actually pick up (Hall, 1994q, pp. 8A).

Businesses seem to be viewing the peso crisis as a painful, but temporary setback. Consumer goods exporters will be the most affected by this crisis. Manufacturers, as well as capital and intermediary goods exporters, anticipate limited declines in business. A kind of rationalization is occurring in the trade because interested firms now have a better idea of what they should be doing in Mexico (Hall, 1995f, p. 3A). Moreover, President Clinton put together a $47.8 billion multilateral bailout package for Mexico under executive authority in February 1995. This removed a major uncertainty in the market for investors (Hall, 1995e, p. 1A). Regardless of the peso crisis, ocean carriers can still find attractive long-term opportunities by developing well-planned marketing strategies. According to William Pelekanos, President of Cargo Transport Lines Inc., "[p]eople who

struggle to get into the service now will reap the rewards if they survive" (Taylor, 1994b, p. 8A).

The purpose of this study was to identify high-growth commodities, classified as being excellent or suitable for containerized transport, including minor bulk, that have strong, long-term cargo capture potential for ocean-liners of any flag of registry serving the US-Mexico trade (United Nations, 1987, p. 26). It should be kept in mind, however, that "[t]he Jones Act restricts all but U.S.-flag carriers from operating between two consecutive U.S. ports" (Brennan, 1994, n.p.). Thus, US-flag carriers serving the trade will have an advantage over foreign-flag vessels because they can also haul cargo between US ports. Regardless, the study was intended to give maritime decision-makers, in general, new insights into the market and its cargo dynamics to promote efforts to rationalize limited marketing and capital resources. Although historical performance does not assure future results, this study provides an adequately researched base on which to formulate long-term business decisions.

Problem Statement

This study analyzed and interpreted US Department Of Commerce general cargo statistics to determine ocean transportation's cargo-capture performance by weight, relative to the air, trucking, and rail sectors of the US-Mexico trade. It included all commodities, which are

classified as being excellent or suitable for containerized transport, that move in this market.

According to Valdes and Crum (1994), trucking moved approximately 85 percent of all US-Mexico commerce by value in 1993. Based on this percentage, remaining market shares for the other modes, by value, were calculated from 1993 US Department Of Commerce statistics. Water transport had an 8.5 percent share, air transport had a 3.8 percent market share, rail transport had an approximately 3 percent market share, and pipeline commerce was estimated to be about 1 percent (US Department Of Commerce, 1993b; and author's calculations). These percentages were based on value only and do not reflect total metric tons hauled. Ocean transportation has a higher market share by total value than rail (due to the influence of bulk commodities). The literature review, however, indicated that rail moves a greater share of the US-Mexico container traffic (Fossey, 1994b, p. 77).

A limited market share for ocean transport can be expected with cargo moving between inland points of shipment and/or destination near the US-Mexico border where trucking and rail provide more efficient service per ton of cargo moved. The cost-effectiveness of trucking and rail, however, begins to decrease the farther cargo must be shipped. Regardless, overall US exports to Mexico grew by an average annual rate of 23 percent between 1988 and 1992, while US

waterborne trade with Mexico only grew by an average annual rate of 6 percent over the same period (Tirschwell, 1994, p. 5A). Thus, land modes still haul most of the trade's containers.

Maritime transportation is generally accepted as the most cost-effective mode of transportation per ton-mile over longer distances. The economies of scale provided by this mode are tremendous considering that one horsepower can move 4 metric tons by water, 0.4 metric tons by rail or 0.15 metric tons by truck (United Nations, 1987, p. 14). This is further evidenced by the fact that ocean transport moves about 99 percent of the world's trade by volume and almost 80 percent by value (Branch, 1986, p. 9). Moreover, "[m]ost of the world's general cargo is carried by liner services and the preponderance of that cargo is containerized" (Marti, 1987, p. 101). Liner transportation is essential to US commerce and should be promoted wherever possible. "Liner cargo service is the most important service for U.S. foreign trade in terms of the relative proportion of cargo carried" (Mukherjee, 1992, p. 50).

At this time, however, maritime transportation has only a small share of the US-Mexico general cargo trade.

> Wary of corruption, cargo theft and bloated labor costs, carriers and shippers in the past tended to avoid the Mexican waterfront in favor of moving goods by rail or truck over the border from the United States (Wastler and Hall, 1993, p. 1C).

The huge disparity in market share between ocean transport and trucking implies that substantial cargo capture opportunities exist for waterborne commerce in the US-Mexico trade. The success or failure of ocean-liner services in the US-Mexico trade will ultimately depend on economic growth, transit times, service reliability, freight rates, and shipper perception (Davies, 1994, n.p.). "...[G]eography, traffic flows, general health, and other factors [also] affect the ability of a carrier to provide an economical price" (Vantuono, 1993, p. 39). See United Nations (1987) for an overview of maritime transportation in Latin America. Other factors, such as the efficiency of Mexican container ports, the overall development of Mexico's transportation infrastructure, and President Zedillo's handling of the Mexican economy are also important to viable US-Mexico liner operations.

Hypothesis

This study hypothesized that the underutilized ocean transport sector has captured, from the air and land sectors of the US-Mexico trade, significant quantities (at least 100 twenty-foot equivalent units or TEUs) of high-growth, general cargoes between 1989 and 1993. These commodities are classified as being excellent or suitable for containerized transport. See Appendix A, p. 331 for definitions of terms.

NAFTA entered into force on January 1, 1994 and effectively created the world's largest free trade bloc. Over time, the tariff reductions required by this agreement will cause cargo flows between member countries to grow dramatically. According to the US Department Of Transportation, US exports to Mexico are estimated to increase from between 65 and 70 percent by the year 2000 (Solomon, 1994, p 3B). This large growth in volume will make it more economical to ship goods by ocean transport (Thuermer, 1994a, p. 25).

Major US imports from Mexico include "...crude oil, oil products, coffee, shrimp, engines, fresh fruit, machinery and equipment, textiles, coal, minerals, agricultural products (cash crops - cotton, coffee, fruit, tomatoes), [and] fish." Major US exports to Mexico include "...grain, manufactured goods, agricultural machinery, electrical equipment, industrial vehicles, automobile parts, telecommunications, electronic machinery, engines, plastics materials and resins, machine tools, laboratory and scientific equipment, consumer goods, [and] oil and natural gas machinery" (Journal Of Commerce, 1992, p. 12C). Most of these goods, many of which are needed for improving Mexico's manufacturing and transportation infrastructure, can be economically shipped in conventional and special-purpose marine containers (Cantwell, 1992, pp. 4B-5B). Containerized transport is probably the most secure and damage-free method available for shipping

manufactured and/or fragile cargo (Russell, 1992, pp. 4-5). New types of containers, such as flat rack, liquid bulk or BulkTainer, dry bulk, platform, half-height, ventilated, insulated, collapsible, livestock, AutoStack inserts, and nitrogen refrigeration, are readily available to haul many commodities previously excluded from containerization due to physical or economic limitations (Atkins, 1983, pp. 216-229; and Knee, 1993a, p. 54). See Atkins (1983), in particular, for an overview of technological advancements in marine freight containers.

New, long-term opportunities will continue to develop for ocean carriers as NAFTA takes effect and Mexico expands its trade in the global market. Containerized liner cargo, in particular, is expected to display the strongest growth (Fossey, 1991b, p. 75). Many carriers, such as Lykes Lines, Sea-Land Service, and Crowley American Transport, are already taking advantage of new growth in US-Mexico trade (Yim, 1994, p. 40). According to E.F. McCormick, President and Chief Operating Officer for Lykes Bros. Steamship Co., "...there is growing demand for all-water service between Mexico and the world" (Damas, 1993, p. 53). Carriers now have access to more productive Mexican container ports, which recently underwent privatization and major infrastructure upgrades.

> Over the past five years the Mexican government has made important new investments in basic port infrastructure, connecting highway and rail lines (Steele, 1994, p. 19).

These upgrades will facilitate the US-Mexico liner trade. Steamship lines, however, must also aggressively promote the inherent economies of waterborne transport (Fossey, 1994c, p. 52). The biggest problem facing ocean carriers in the trade today is that most shippers still insist on using trucking or rail to move their goods even when ocean transport is the more economical option (Dunlap, 1993b, p. 4A).

Delimitations

Historical and most recently available economic data were used to analyze cargo dynamics in the US-Mexico trade. Statistics from 1989 (the earliest compatible trade data available) and from 1993 (the latest compatible trade data available) were used to determine trends in US-Mexico general cargo flows. The NAFTA text analysis was limited to a few provisions affecting the ocean transport of general cargo. The study addressed the air, trucking, and rail transport sectors, as well as Mexico's port upgrade program, only to the extent of their impact on US-Mexico ocean-liner operations. The term *port* was used throughout the study as a reference to general cargo and container ports, unless otherwise specified. Canada's role in NAFTA was examined only to the extent of its impact on US-Mexico waterborne containerized cargo flows. This study focused primarily on longer-term cargo capture opportunities for ocean carriers in the US-Mexico market. This makes the results more beneficial

to steamship lines trying to assess the ramifications of the recent peso crisis on their operations (Hall, 1995a, p. 1A).

Finally, the vast majority of relevant literature found during the library search was dated from the late-1980s to the overall search cutoff date of February 1, 1994. The Journal Of Commerce was subsequently monitored until March 8, 1995 for major developments affecting the US-Mexico liner trade.

Assumptions

This study was based on eight assumptions. First, it was assumed that intermodal movements, i.e. utilizing two or more different modes of transport to move a shipment, are common among shipments to and from Mexico. This study focused on the mode actually transporting the cargo across the border or between the port of export and port of entry. Transshipments of Mexican cargo through US ports are also included in US trade statistics (i.e. re-exports). Second, it was assumed that Mexico will continue to heavily invest in its communications, energy, highway, air, rail, and port infrastructure to maximize the potential benefits of NAFTA. Third, it was assumed that 100 TEUs (approximately 1,000 metric tons) is a significant amount of cargo. Fourth, it was assumed that ocean carriers consider US-Mexico waterborne container service to be economically feasible, at least where adequate infrastructure exists to handle marine containers.

Fifth, it was assumed that truck and rail commodity values per metric ton approximate maritime transport commodity values per metric ton. This assumption was based on the concept of intermodalism.

> ...[A] shipper located thousands of miles from the seacoast may pack his goods in a standardized container and send the box by truck, barge, ship, and railroad to an overseas destination under a single contract of carriage which adequately protects all parties concerned at any given moment during the period the goods are in transit (Kendall, 1986, p. 223).

Intermodalism implies that general cargo regularly shipped in a marine freight container can be moved indiscriminately by truck and/or rail in the same container. When air transport is involved in the intermodal shipment, however, marine containers have to be stripped and the cargo re-stuffed into smaller air freight containers. Nevertheless, air-ocean freight is becoming more commonplace even though air cargo is still perceived by many shippers as something they would reserve for emergencies or high-value, time-sensitive shipments (Armbruster, 1994, p. 25C; and Delia-Loyle, 1992, p. 16).

Sixth, it was assumed that all cargo included in the study was either an excellent or suitable candidate for containerized transport, including minor bulk. This assumption does not imply that these commodities *actually* moved by container, but that they readily *could*. This makes them attractive for capture by ocean-liner transport. Palletized cargo, for example, is a good target for

containerized transport because the latter provides better security throughout the shipment. Palletized cargo is more susceptible to damage from improper stowage, inconsistent climate control, reckless cargo transfer operations, and pilferage (Fairplay, 1994, p. 26). Many factors, however, determine the optimal mode of transport and "...simply because a commodity such as fruit can be stuffed inside a container doesn't mean that all fruit shipped to the United States eventually will be transported in containers" (Dunlap, 1993a, p. 9A). In reality, only a relatively small number of marine containers are currently moving in the US-Mexico trade. The Journal Of Commerce estimated that during 1993, only around 20,000 containers of export cargo moved from the US to Mexico by water (Tirschwell, 1994, p. 5A).

Seventh, it was assumed that all dates and corresponding events used in the historical analysis were given facts or common information regarding the US-Mexico trade. The large number of recorded dates and events (almost 600) precluded citing each one. The general publications from which all information was collected are listed in Appendix B, p. 335.

Finally, it was assumed that a short-term event or decision indicated an approximately twelve month or less time frame. A long-term event or decision referred to a period of approximately two to five years. This assumption was based on generally accepted corporate financial planning horizons (Ross, Westerfield, and Jordan, 1995, pp. 83-84).

Related Research

A review of the National Trade Data Bank Survey Of Current Research On NAFTA, 1991-1993 Current Literature In Traffic And Transportation Indices, 1982-1993 Dissertation Abstracts, and other relevant sources indicated a substantial lack of academic research addressing US-Mexico waterborne containerized cargo flows with two significant exceptions.

The first was a 1993 Maritime Administration (MARAD) report entitled Maritime System Of The Americas: River/Ocean Operations (US Department Of Transportation, 1993b, p. 1). It addressed the feasibility of commerce by river barges and ocean/river vessels (1,500 to 3,000 dwt) between US Gulf coast/Mississippi River hinterlands, central Canada, and Mexico's east coast ports. Such vessels have significantly smaller cargo capacities than conventional freight ships serving deep water ports (Sansbury, 1994a, p. 7B). The report promoted water transportation alternatives between the US Midwest/Gulf coast and Mexico by focusing on a few key commodities.

Another MARAD study was published in October 1994, but was not yet released by the government as of March 1995. This new report will address the feasibility of short-sea routes and conventional deep draft shipping operations in the US-Mexico trade (Carlino, 1995, p. 1C). Both reports are portions of a larger MARAD research project called the

Maritime System Of The Americas. This project focuses on some regional cargo opportunities, as well as the operational feasibility and cost effectiveness, of various water transport options between the US and Mexico (US Department Of Transportation, 1994, pp. 58-59). These studies, however, do not provide a comprehensive analysis of general cargo, which is classified as being excellent or suitable for containerized transport, throughout the US-Mexico trade.

Significance Of The Study

This study determined the extent to which ocean transportation has captured or lost general cargo, which is classified as being excellent or suitable for containerized transport, from or to the land and/or air modes serving the US-Mexico market. It also assessed major trade dynamics prevailing in the market from approximately 1910 to 1995. The results provide maritime transport decision-makers with new and adequately researched insights on which to base future, long-term activities in the dynamic, but recently unstable, US-Mexico trade. A steamship company's marketing staff, for example, could use the study to diversify its US-Mexico customer base by targeting importers, exporters, US State Trade Offices, and trade associations. The emphasis should be to secure long-term, high-growth cargo classified as being excellent or suitable for containerized transport. See Encyclopedia Of Associations (1994a and 1994b) for

domestic and international trade associations and Hall (1995f) for US State Trade Offices in Mexico City.

CHAPTER TWO

LITERATURE REVIEW

US-Mexico Trade

The North American Free Trade Agreement, negotiated between the United States, Mexico, and Canada in the early-1990s, went into effect on January 1, 1994. It created a North American trading bloc comprised of over 360 million consumers with a six trillion dollar combined gross domestic product (National Trade Data Bank, 1994a, CD-ROM). NAFTA will help the US, Mexico, and Canada to compete more effectively against the European Economic Area and the Association of Southeast Asian Nations (Manzella, 1994, pp. 4-10). The goals of NAFTA are: (1) to reduce international trade barriers, including tariffs and quotas, between party states; (2) to stimulate domestic production; and (3) to enhance cross-border economic interaction. This study focused primarily on the US-Mexico market.

> ...[W]hat NAFTA does, in essence, is to reinforce trends that have been present, on both sides of the border, for many years now (Ros, 1992, p. 87).

Trade between the US and Mexico has been rapidly expanding since 1989. Total US imports from Mexico that year were valued at over $27 billion and total US exports to Mexico were worth almost $25 billion. Total US imports from Mexico

in 1993 were valued at nearly $40 billion and total 1993 US exports to Mexico were worth over $41.5 billion; a total trade of almost $81.5 billion for the year. Thus, US imports from Mexico, by value, changed by 47 percent over the period, while US exports to Mexico changed by 66 percent (US Department Of Commerce, 1989; US Department Of Commerce, 1993b; and author's calculations). Trade between the US and Mexico was increasing even before NAFTA, as evidenced above. It is continuing to grow after the agreement's introduction, as well. "[US]-Mexico trade hit a record $92 billion in 1994 thanks to the implementation of [NAFTA]..." (Carlino, 1995, p. 1C). The agreement will continue to improve the trade's historic growth, provided it is not interfered with by US-Mexico anti-dumping litigation, i.e. selling a good below cost to gain market share (Mongelluzzo, 1995, p. 3A). The cumulative effects of NAFTA are likely generate many new opportunities for ocean-liners in the trade over the next few years (Memmott, 1995, p. 1B). It must be kept in mind, however, that Mexican ports "...don't stimulate economic activity, they reflect it. There has to be cargo to move through those ports. Mexico is a country of 80 million people, and their standard of living has to improve..." in order to generate these cargo flows (Whitney, 1994, p. 9A).

Mexico has been undergoing drastic changes since 1988 due to the economic reforms initiated by former-Presidents de la Madrid and Salinas (Kate, 1992, p. 667). Its economy has

shifted from being based on "...raw materials and primary production to one where manufacturing and assembly industries are increasingly important" (Containerisation International, 1992, p. 8). This is reflected in the present composition of Mexican industry that includes "food and beverages, tobacco, chemicals, iron and steel, petroleum, mining, textiles, clothing, [and] transportation equipment" (Journal Of Commerce, 1992, p. 12C). Moreover, between 30 and 35 percent of Mexico's exports (by value) now come from the manufacturing sector (Containerisation International, 1992, p. 8). According to the US International Trade Commission, US imports from Mexico in autos, automotive parts, computers, computer components, electronics, textiles, apparel, ceramic tile, and major household appliances could increase anywhere from 3.4 percent to 15.4 percent, as a result of NAFTA (Mintz, 1993, p. 2). The variety of products traded in the US-Mexico market is quite extensive.

All of this is encouraging for the US-Mexico maritime transport sector. Since manufactured goods tend to be of higher value than raw or primary commodities of low intrinsic value, they are prime targets for capture by ocean-liner transport (Kendall, 1986, p. 7). Most manufactured cargoes can now be shipped by marine container instead of in boxcars, cargo jets, truck trailers or aboard break-bulk vessels. Thus, ocean carriers of any flag now have the opportunity to capture substantial amounts of liner cargo, including minor

bulk, from trucking, rail, and air. Regardless, the overall health of the US-Mexico trade depends on efficient transportation infrastructures in both countries. Mexico has always had chronic problems in this area. President Salinas, however, took substantial measures during his administration to improve Mexico's ability to engage in global commerce.

> It is a priority to increase the supply of [Mexico's] transportation infrastructure and maintain the present facilities, to avoid bottlenecks in all sectors of the economy, especially in foreign trade (Steele, 1994, p. 16).

US-Mexico Transportation

In 1994, Mexico's Communications and Transport Ministry announced a $16.7 billion plan to continue upgrading the country's infrastructure. It allocated $10.7 billion for highways, $3.1 billion for communications, $1.6 billion for railroads, $600 million for ports, and $467 for airports (Hall, 1994d, p. 3B). These expenditures are highly significant considering that "Mexico's economic difficulties from 1982 to 1988 largely suspended investment in the country's public services" (Distribution, 1993, p. 24). Mexico is now taking extensive measures to improve its transport network to handle the anticipated growth from NAFTA tariff reductions. The peso crisis also prompted the Mexican government to initiate a $14 billion emergency plan to privatize major portions of its industrial sector including the state-owned railroad — Ferrocarriles Nacionales de

Mexico, airport services, and power generation (Hall, 1995h, p. 8A). It will take time, however, for Mexico to overcome the substantial problems facing its economy and transportation system (Valdes and Crum, 1994, p. 17).

Intermodal transportation is a good example of an industrial sector certain to benefit from NAFTA because all four elements — marine, trucking, rail, and air (with re-packing of cargo) — are geographically and economically well-positioned to take advantage of regional growth. Intermodalism is an integrated, multimodal cargo system that moves large amounts of higher-valued commodities (Hall, 1993g, p. 10A). Many general cargo shipments between the US and Mexico now have an intermodal component.

> ...[T]ransportation is multimodal by nature, and much of today's product requires multimodal transportation from its origin to destination (Journal Of Commerce, 1994c, p. 1A).

As a result, new joint-ventures are being developed among the various modes serving the trade. KLLM Transport Services (a trucking firm) and Cargo Transport Lines (an ocean carrier), for example, initiated a joint, cross-Gulf service in 1994 to bypass congested border crossings (Taylor, 1994a, n.p.). The Mexican government is well aware that intermodalism "...holds the key to its trading future..." and is taking extensive measures to improve the country's transportation infrastructure (Taylor, 1993a, p. 12C). It has already completed much of this upgrade program, including new intermodal yards in Monterrey, Guadalajara, and Mexico City.

> ...[C]ombined with intermodal terminals, the transport infrastructure in Mexico is falling into place to meet the needs of the North American Free Trade Agreement (Hall, 1994o, p. 8A).

Major impediments remaining to intermodalism in the US-Mexico trade, including border delays resulting from customs processing, are now more institutional in nature than technological (Vantuono, 1993, pp. 40 and 42). Corruption, for example, is still widespread in Mexico where it is viewed more as a "system of favors". NAFTA, however, will reduce some of the bureaucratic obstacles which lead to corruption by forcing Mexico to abide by international trade standards (Hayward, 1993, p. 4A). Moreover, new trade liberalization policies are somewhat relieving border congestion, customs delays, and complicated cargo transfer operations forced upon carriers by restrictive Mexican cabotage laws (Thuermer, 1994b, p. 22). See United Nations (1989) for an overview of intermodal transportation in Latin America.

Most cargo flowing between the US and Mexico is coming from or destined to the primary Mexican industrial regions of Monterrey, Guadalajara, and Mexico City, which comprise about 35 million people in their surrounding metropolitan areas (Muller, 1993, p. 44). See Figure 1. Monterrey alone accounted for nearly 50 percent of Mexico's industrial GDP in 1993 (Brohl, 1993, p. 27). Trucking continues to dominate the US-Mexico trade "...partly because much of the freight is bound for border assemblage operations and because there are good road connections to the major metropolitan areas of

FIGURE 1

MAP OF MAJOR PORTS AND INDUSTRIAL CENTERS IN MEXICO

Source: Fossey (1994a, p. 34)

Monterrey and Mexico City" (Hall, 1994l, p. 16C). Many trucking companies including KLLM, Celadon, and J.B. Hunt are now taking advantage of new growth in the trade. They will directly benefit from NAFTA provisions specifically liberalizing US-Mexico trucking operations (Distribution, 1994, p. 26). See Valdes and Crum (1994) for a study of trucking operations in the US-Mexico trade.

Trucking dominates the trade for reasons other than just market proximity. First, the Mexican state-owned railroad, Ferrocarriles Nacionales de Mexico or FNM, is seen by Mexican business interests as the current weak link in Mexico's transportation network. FNM is inefficient, slow at clearing shipments through customs, inattentive to customer needs, inconsistent, and "...has a bloated bureaucracy that makes marketing against truck traffic difficult" (Hall, 1995d, p. 9A). Second, trucking hauls most of the trade's cargo because the once-decaying Mexican port system forced shippers to find alternative modes of transport long ago. "Historically inefficient and corrupt, ports in Mexico were a primary reason land-border crossings grew tremendously over the past decade" (Hall, 1994n, p. 12A). Even though Mexico has undertaken extensive measures to upgrade its port system, border points already have functioning value-added services demanded by shippers, such as customs brokerage and freight forwarding (Hall, 1994m, p. 1A). One problem that all modes are experiencing in the US-Mexico trade, however, is finding

sufficient backhaul cargo to prevent deadhaul equipment repositions.

> Despite the growth in two-way trade since passage of the [NAFTA], northbound traffic continues to lag. Steamship lines, truckers, and railroads all are competing for a small pool of northbound loads (Hall, 1994o, p. 8A).

The recent Mexican Peso crisis, however, may actually ease this problem by balancing out equipment flows in all modes serving the market (Armbruster, 1995, p. 9A; Hall, 1995a, pp. 1A and 8A; and Hall, 1995d, p. 9A).

Even though trucking handles the vast majority of US-Mexico commerce, it has significant drawbacks. "National interests, the necessity of customs clearance, and the less developed transportation system and logistics management practices in Mexico result in disrupted service, excessive handling, time delays, and added costs" (Valdes and Crum, 1994, p. 5). Another problem is that Mexican law prohibits foreign truck and rail carriers from operating within the country. This means that all trailers and trains must be handed off to or received from Mexican counterparts at the border causing further delays (Hall, 1994g, p. 1A). Trucking is also more expensive per ton-mile, compared to rail and ocean transport. It is already beginning to lose cargo to the latter modes due to these and other forces. "With problems of cargo theft on the highways and a new port modernization push, traffic is beginning to pick up again at Mexico's waterfronts" (Hall, 1994n, p. 12A). Moreover, unit

or stack-trains provide for a more secure shipment than trucking (Castillo, 1993, p. 10). APL, for example, recently announced plans to use Mexican rail links to move its container traffic inland from the Port of Manzanillo in an effort to counter truck hijackers on Mexican highways (DiBenedetto, 1995, p. 2C). Regardless, new growth in the trade means that competition will "...remain intense as the vessel operators, truckers, and railroads all vie for a piece of the action" (Fossey, 1991a, p. 69).

FNM is widely viewed as the current major impediment to efficient rail service in the US-Mexico trade. It was finally designated for privatization by the Mexican government in January 1995 to generate desperately needed capital (Journal Of Commerce, 1995b, p. 2B). Despite FNM's problems, major railroads, including Santa Fe, Burlington Northern, CSX, Southern Pacific, Union Pacific, CP Rail, and CN Rail, remain optimistic about the market (Kaufman, 1994a, p. 6A; and Cray, 1994, pp. 22-23). Even though US-Mexico rail traffic decreased between 1987 and 1992, railway container traffic "...experienced consistently strong growth over this period" (Fossey, 1994b, p. 77). Moreover, US and Canadian railroads finally gained permission from Mexican customs officials in 1994 to move trailer-on-flatcar (TOFC) or piggyback shipments in-bond into Mexico to avoid lengthy customs delays at the border (Hall, 1994h, p. 8C). The railroads hope the new in-bond shipments will encourage some

trucking companies to switch to the TOFC service so they can speed up their border crossings with additional security. In December 1995, US, Mexican, and Canadian railroads were dealt a serious blow by the Mexican Peso crisis. Nevertheless, the devaluation will indirectly benefit rail transport in three ways. First, it should help alleviate south-bound equipment imbalances in the US-Mexico trade (Hall, 1995d, p. 9A). Second, it should make Ferrocarriles Nacionales de Mexico rail rates more attractive to shippers.

> Despite the fact that truck rates can be as much as three times that of railroads, shippers have preferred to pay more to get better and more reliable service. But with the 40% drop in purchasing power of Mexican importers, the FNM's rates are even cheaper against truck rates and may make the difference in luring shippers rocked by Mexico's surprise economic tailspin (Hall, 1995d, p. 9A).

Third, the Mexican Government passed an important constitutional amendment in January 1995 to raise urgently needed capital. It effectively removed FNM from Mexico's list of strategic national industries under Article 28 (Journal Of Commerce, 1995b, p. 2B). Before January 1995, FNM could not be privatized under law and this was a major obstacle to improving its efficiency. US and Canadian railroads have been trying to convince Mexico for years to permit foreign investment in FNM so they could upgrade the North American rail network with advanced technology. The amendment means that FNM will be privatized after President Zedillo determines the extent to which it will be opened to

foreign investment. This is a major breakthrough for intermodal transportation in the trade (Journal Of Commerce, 1995b, p. 2B).

Air cargo also serves the US-Mexico market, but to a lesser degree than trucking, rail, and water. Because NAFTA mainly promotes the trucking industry, other modes serving the trade, i.e. air, water, and rail, are on their own to generate cargo traffic in the US-Mexico market (Dalton, 1994, p. 24). Air transportation is unlikely to reach its true potential until the rest of Latin America can be included in the North American Free Trade Agreement. Only then will carriers be able to use Mexico as a hub for air-land or air-sea intermodal shipments into Central America.

> The relatively short distances between commerce centers, combined with the all-land routes linking the three [NAFTA] countries, diminish the importance of air freight, which thrives on making long treks, often over water (Solomon, 1992, p. 7C).

These drawbacks are not stopping air cargo carriers, such as Emery Worldwide, United Parcel Service, Air Express International, and Panalpina, from serving the US-Mexico market. They believe that air commerce will increase dramatically, once the potential of NAFTA is realized. Air cargo is expected to benefit primarily from NAFTA-generated growth in the electronics, aeronautical equipment, and auto parts sectors (Hall, 1994p, p. 3B). Carriers are already expanding their operations to handle the anticipated demand for air transport services (Armbruster, 1993, p. 1A).

Federal Express, for example, has already spent large sums of money to upgrade its Mexican infrastructure, including package tracking capabilities and employee training programs (Martos, 1993, p. 22). Burlington Air Express is increasing its lift capacity in the US-Mexico trade and is expanding service to other Mexican airports. A major obstacle to more efficient US-Mexico air cargo operations is a Mexican customs clearance requirement that prevents in-bond shipments. This is significant because an entire load can be held up due to problems with one package in a consolidated shipment (Hall, 1994b, p. 3B). Since consolidated freight dominates most US-Mexico airborne cargo shipments, the lack of in-bond customs clearance is a serious impediment to efficient operations requiring fast delivery times, such as just-in-time service.

Mexico has decided to privatize its inefficient airport system even though overall administration will stay under government control. Monterrey, Cancun, and Guadalajara will probably be the first airports to undergo privatization.

> ...[T]he government would grant concessions for "administraciones aeroportuarias integrales (AAI's)" - integral airport administrations - whose functions would include planning, programming, development and terminal-area tasks (Hall, 1993e, p. 3B).

Larger cities, such as Monterrey, Guadalajara, Tijuana, Mexicali, and Cancun, are also likely to receive new air cargo terminals where "...airport officials are giving great attention to fostering intermodal freight movements" (Hall, 1994e, p. 3B). Most air carriers say they have not

experienced a significant drop in cargo due to the recent peso crisis. While it is too soon to determine the long-term implications of the devaluation, air cargo managers believe it will help balance out their US-Mexico operations in the long-run. Burlington Air Express and Emery Worldwide say they are continuing to experience normal traffic in the trade.

> ...[A]irborne shipments to manufacturing plants operated by their customers have not been affected [by the peso crisis]. Products necessary to support assembly lines continue to move, primarily in the automotive sector (Armbruster, 1995, p. 9A).

Regardless, the incremental effects of NAFTA, severe border congestion, the lack of in-bond shipments for air freight, and a more efficient Mexican port system may provide shippers with the financial incentive to utilize maritime transportation.

> Increased two-way trade and inadequate infrastructure will lead to more congestion at border crossings and that may lead to some substitute water services from California, Florida, and the East Coast (Hall, 1993a, p. 13).

Mexican Port Revitalization

Mexico needs a strong port system to compete effectively in global trade and to develop the country's true economic potential. Until recently, "Mexico's ports had a reputation for pilfering and corruption, which helped drive increased train and truck service into busy interior points like Monterrey and Mexico City" (Hall, 1993b, p. 8B). The old

centralized port administration — Puertos Mexicanos, low levels of private investment, a lack of competition within and among ports, and inadequate communications networks have all affected Mexico's ability to meet international economic standards (Steele, 1994, p. 19).

> Mexico's ...extensive coastline and strategic location in the belt of the North American continent have been poorly exploited (Castillo, 1993, p. 4).

Mexico's government, however, is trying to improve the level of efficiency within its port system not only to handle increasing trade, but also to relieve congestion at rail and highway border crossings (Bonney, 1992, p. 42/11). This will not be achieved, however, unless Mexico continues to "...eradicate corruption in its customs service; ...invest in modern transportation equipment and highways; raise the level of professionalism in the transportation workforce; and design and build better freight terminals and warehouses" (Muller, 1992, pp. 36-37). It is, therefore, very important that Mexico improve all aspects of its transportation network if ocean transportation is to significantly benefit from increasing trade in the US-Mexico market.

> As long as Mexico didn't have the transportation infrastructure, you could dig the deepest channels and build the greatest ports in Mexico and it all wasn't worth anything. [NAFTA] would make it possible for Mexico to attract that investment (Davies, 1993, p. 1B).

Even though NAFTA deals primarily with the trucking aspect of cross-border transportation, it also has a

provision regarding the shore-side aspects of maritime transportation. It can be found in Annex II - Schedule of the United States, Subsector: Water Transportation. This section contains water transportation reservations by the United States regarding issues, such as cabotage. Annex II, however, also contains certain maritime services specifically excluded from the reservations that are apparently open to foreign investment.

> ...[V]essel construction and repair, and ...landside aspects of port activities, including operation and maintenance of docks, loading and unloading of vessels directly to or from land, marine cargo handling, operation and maintenance of piers, ship cleaning, stevedoring, transfer of cargo between vessels and trucks, trains, pipelines and wharves, waterfront terminal operations, boat cleaning, canal operation, dismantling of vessels, operation of marine railways for drydocking, marine surveyors, except cargo, marine wrecking of vessels for scrap and ship classification societies (National Trade Data Bank, 1994c, CD-ROM).

Although Mexico's NAFTA schedule could not be obtained because of its high cost, the literature review clearly indicated that these exclusions were initiated by Mexico and equally apply to all three countries (Global Trade & Transportation, 1993a, p. 15). Maritime transportation in the US-Mexico trade has been severely hindered by Mexico's substandard port system. To make the system work more efficiently, "[c]ompanies need to be able to provide their own stevedoring and port services at reasonable rates, and the ports need to get out of the monopolistic practices of the past" (Hall, 1994n, p. 12A). Major carriers, such as

Sea-Land and American President Lines, know they can operate a marine terminal better than any governmental agency. The above NAFTA exclusions will help achieve this goal by eventually attracting foreign investment through concessions. This will ultimately improve the efficiency at Mexican container ports to international levels. It will also allow Mexico to re-capture "...Mexican origination-destination cargo which is currently routed through the US ports of Los Angeles/Long Beach, Galveston and Houston and trucked or railed across the border..." (Munford, 1993, p. 29).

Mexican ports have been labor intensive and corrupt for many years. The Port of Veracruz, for example, used to have one of the highest robbery rates of any port in the world (Russell, 1992, p. 4). Mexican ports were more expensive to use and less productive than US ports over past years. They were congested, had limited infrastructure, and were severely lacking in efficient inland distribution centers (Containerisation International, 1992, pp. 8-9). Shippers had to rely on more cost-effective modes of transportation which, under these conditions, were trucking and rail.

> A non-competitive port environment translates into higher ocean-liner rates, reduced competitiveness of exports in world markets, higher prices for imports, and a decrease in the overall volume of goods liner operators might transport (United Nations, 1989, p. 86).

In 1989, President Salinas of Mexico decided that privatizing marine terminal operations and port services, such as stevedoring, were the best way to cut operating costs and to

improve efficiency in the Mexican port system. He said in 1991 that Mexico's port system was "a key element" in developing the country's economy (Russell, 1992, p. 4). President Salinas' objective was to minimize bottlenecks in the country's international trade (Containerisation International, 1992, p. 9). He began an extensive infrastructure upgrade program in 1989 to overhaul the country's antiquated port system, with special attention given to the primary Mexican container ports.

Mexico's port upgrades focused on inadequacies in specific areas including container yards, cranes, gates, berthing, dredging, labor, and the intermodal interface with trucking and rail (Dowd and Leschine, 1990, p. 111). Mexican container ports had serious problems in all of these areas. President Salinas took aggressive action and spent large sums of money to improve them (Fossey, 1991b, p. 75). Even though Mexico has 27 major seaports, of which 18 are deep-water commercial ports, container facility investment focused on transforming the ports of Veracruz and Altamira/Tampico on the east coast and Manzanillo and Lázaro Cárdenas on the west coast into container hubs (Steele, 1994, p. 20; and Hall, 1994i, p. 8B). See Figure 1, p. 23.

> As part of a US$125mill package partly funded by the World Bank, which also covered the upgrading of existing berths/yard areas and, in the case of Manzanillo, the construction of a completely new container terminal, Veracruz, Altamira, Lazaro Cardenas and Manzanillo are each receiving two new ship-to-shore cranes and four rubber tyred gantries (Munford, 1993, p. 29).

The initial program to upgrade primary Mexican container ports was largely completed by the end of 1993 and all new gantry cranes are now fully operational (Fossey, 1994a, p. 31). See Appendix C, p. 336 for the basic infrastructure at primary Mexican container ports.

Container traffic through Mexican ports increased by 91 percent between 1988 and 1992; from over 250,000 TEUs to almost 450,000 TEUs (Nihill, 1993, p. 22; and US Department Of Transportation, 1993b, p. iii). Some officials are forecasting container movements through Mexican ports to triple by the end of 1998 (Mongelluzzo, 1994b, n.p.).

> In Mexico... seaports handle 29 percent of Mexico's freight transport tonnage. Current ocean cargo movements fall short of reflecting the country's relatively high level of development and enormous potential for growth. But traffic is increasing fast (Steele, 1994, p. 16).

Mexico is concentrating its port upgrade program on ports with container handling facilities. "Over 80 percent of Mexico's ocean-borne intermodal traffic and 30 percent of all domestic traffic moves through just 24 ports..." (Burke, 1994, n.p.). Nevertheless, large ocean carriers admit it is unlikely they will include ports, such as Ensenada, into their main-line itineraries. The smaller Mexican ports will most-likely serve as regional feeder ports (Hall, 1993d, p. 8B). See Appendix D, p. 337 for a breakdown of container movements through Mexico's major seaports between 1989 and 1992. Mexican ports have also historically lacked adequate freight forwarding, customs brokerage, and other value-added

services demanded by shippers. Port officials are now taking measures to make them available. These new services will allow the ports to compete more effectively with land border crossings (Hall, 1994m, p. 1A).

Most of the improvements in the US-Mexico waterborne container trade are being carried out in Mexico. Mexico's major port infrastructure upgrade plan was largely complete by the end of 1993 and the focus has since shifted to privatizing the ports. Although port privatization will relieve some of the Mexican government's fiscal burden, great care must be taken to set up appropriate supervisory arrangements. "Private monopolies can be as evil as public ones" (Eyre, 1990, p. 120). The Mexican government adopted the Law of Ports in 1993, which declared it would no longer operate or administer the ports, associated facilities, terminals or services. Puertos Mexicanos, the old centralized port authority created in 1989 to overhaul Mexico's antiquated port system, was dissolved on September 30, 1994. See Eyre (1990) for an informative discussion about the privatization of ports and shipping in developing countries.

Administraciones Portuarias Integrales (APIs) or integral port administrations have been established at all Mexican ports over the past two years to improve the system's flexibility and to attract additional carriers (DiBenedetto, 1995, p. 2C). They will independently administer and operate

the ports as chartered corporations, which are similar to autonomous port authorities in the United States (Nagel, 1994b, p. 7A). APIs will be responsible for port planning, construction, promotion, and awarding terminal operations and service concessions. The government, however, will retain ownership of all existing port infrastructure, surrounding waters, and waterfront property as required by Article 27 of the Mexican Constitution (Hall, 1994c, p. 3A; and Steele, 1994, pp. 19-20). "Although maritime and rail transport were excluded from the [NAFTA], they figure prominently in [Mexico's] new investment law" (Hall, 1993f, p. 1A). This law reflects the first major change in Mexico's foreign investment rules since 1973. APIs are open to 100 percent private investment, although foreign investors are limited to a 49 percent share. Nevertheless, port concessions will be open to 100 percent foreign investment (Steele, 1994, pp. 19-20). "Mexico's port privatization push has started to pay off with greater steamship activity ...and growing interest in water options for shippers" (Hall, 1994n, p. 12A). Fixed-year, container port operations concessions at Manzanillo, Lázaro Cárdenas, Altamira, and Veracruz are the ones most sought after by potential investors. Bidding rules for these four ports were finally released in March 1995 (Hall, 1995h, p. 1A).

> Several U.S. companies and their joint-venture partners have won long-term contracts from the Mexican government to operate terminals at ports across Mexico. And, as part of the country's port

> reform process, new laws allow terminal operators to use their own stevedores or contract out. Stevedoring had been done by unions known as "sindicatos", which had a powerful grip on waterfront activity. Under the new laws, the unions can still work the ports, but must register as a company and must compete against other private stevedoring outfits (Hall, 1994j, n.p.).

Mexican port administration officials presently seem to be focusing on generating " ...volume in the ports and... efficiency in the ports" (Hall, 1994i, p. 8B). It is interesting to note that robberies at the Mexican Port of Veracruz have fallen by 99 percent since it was privatized and throughput efficiency has improved tremendously (Russell, 1992, p. 4). See Fossey (1994a) for further details about Mexico's port privatization program.

Ocean carriers are not the only players in marine transportation developing new relationships with Mexico. "U.S. ports are preparing for the boom by establishing marketing offices and enhancing their ties with Mexican shippers" (Taylor, 1993a, p. 12C). The top-ten US ports serving the US-Mexico trade in overall commerce are, in declining order, Houston, Pascagoula, Gramercy, Lake Charles, New Orleans, Texas City, Corpus Christi, Tampa, Baton Rouge, and Port Arthur (Beargie, 1994, p. 8). Overcapacity in the US port system will permit these and other ports to promote waterborne commerce as a way to reduce border congestion and increase cargo throughput at their own ports (Yim, 1994, p. 40). There is also some interest in extending the US Intracoastal Waterway from Brownsville, Texas into

Tamaulipas, Mexico to reduce border congestion. The estimated cost is $120 million. Construction, however, may not occur in the near future due to opposition by environmental groups (Alm, 1993, p. 2B).

Mexico has clearly taken extensive measures to upgrade its port infrastructure. Although its container ports are now operating at new levels of efficiency, the conversion of Mexican container ports into world-class contenders is far from over. One major problem continued to plague the privatization program until 1995.

> No matter what the U.S. does to improve transportation to Mexico, the gains will be lost if the Mexicans don't also make necessary changes. That was supposed to include the privatization of the ports, which began with a flurry when the state-owned company that managed the ports was disbanded. But then the process ground to a halt when it couldn't be decided precisely which private companies would be granted the concessions. Until that is worked out, the new intermodal links won't live up to their full potential (Journal Of Commerce, 1994d, p. 7A).

Mexico, however, recently announced a plan that will accelerate bidding on private marine terminal concessions to generate urgently needed capital. Mexico hopes to raise $200 million with this move (Hall, 1995b, p. 1B). As mentioned earlier, bidding rules for 15 and 20 year port operation and service contracts at Mexico's four major container ports were released in March 1995. Both carriers and stevedores, as long as they are registered companies in Mexico, are eligible to bid on these concessions. A single firm, however, is not allowed to operate more than one port on the same coast

(Hall, 1995h, p. 1A). Regardless of remaining port upgrade and privatization problems, Mexican container ports are operating at greatly improved levels of efficiency. The new port administrations are currently forced to resolve problems locally instead of passing off decisions to Puertos Mexicanos in Mexico City, which was common practice before 1995. In any event, most ocean carriers interested in the US-Mexico trade plan to ride out the peso crisis to ensure good market position once it passes (DiBenedetto, 1995, p. 2C).

US-Mexico Ocean-Liner Transportation

Many ocean carriers stopped providing liner service to Latin America in the early-1980s due to regional political and economic instability (Delia-Loyle, 1992, p. 18). Although more carriers are returning to the US-Mexico trade, ocean transportation faces strong competition from other modes of transport. This is evidenced by the fact that between 1988 and 1992, US exports to Mexico grew by an average annual rate of 23 percent, while US waterborne trade with Mexico only grew by an average annual rate of 6 percent over the same period (Tirschwell, 1994, p. 5A). Regardless, many areas of Mexico are not well served by conventional rail, such as the Yucatan Peninsula. Others are too distant for cost-effective trucking. Air transport also has major drawbacks, such as smaller cargo capacity and higher freight rates. Ocean transport can provide more cost-effective

service in all of these circumstances (US Department Of Transportation, 1993b, p. 114).

> Water routes can compete economically on shipments to Mexico bound anywhere south of San Luis Potosi [west of Tampico] ...and 80 percent of the Mexican population lies south of that line (Taylor, 1994a, n.p.).

The ports of Manzanillo and Veracruz, in particular, are well positioned for service as gateways to Guadalajara and Mexico City, respectively. The ports of Tampico and Altamira are gateways to Mexico City and, to a lesser degree, Monterrey. See Figure 1, p. 23. The ports of Manzanillo and Lázaro Cárdenas are also expected to develop into hubs for the Mexico-Asia trade (Hall, 1995h, p. 8A).

According to one New England shipper, it costs $2,400 to move a 40 foot container door-to-door from a plant in Massachusetts to an inland destination in Mexico (including intermodal transfers) using ocean transport. The same move entirely by truck has a total cost of $3,600 (Lelyveld, 1994, p. 1B). Lykes Lines said it can move cargo from the Northeast to Mexico cheaper and faster than trucking (Giermanski, 1994, p. 6A). Other ocean-liners claim that "...land transport costs are four or five times higher per TEU-km than are ocean transport costs" (United Nations, 1989, p. 41). Moreover, shipping cargo by marine container aboard a liner vessel minimizes its exposure to damage. With rail and trucking there is too much "shifting around" of the cargo (Telfer and Hall, 1994, p. 8A). See US Department Of

Transportation (1993b) for a distance-decay study of the US Midwest-Mexican Gulf coast maritime transport sector.

There is a growing trend among liner companies in the US-Mexico trade to rationalize infrastructure, i.e. share hardware, to promote greater asset utilization (McKinnon, 1992, p. 39). This change can be seen in the recent Sea-Land/Maersk Line, American President Lines/Transportación Marítima Mexicana, and Ivaran Line/Nacional Line/Transportación Marítima Mexicana container-slot and vessel-sharing agreements (Hall, 1994k, n.p.; Hall, 1995g, p. 8B; and Nagel, 1994a, p. 10A). Several ocean-liner companies have also expressed interest in consolidating empty containers from waterborne shipments to Mexican ports at new intermodal yards in Guadalajara, Monterrey, and Mexico City. This would allow them to compete more effectively for northbound intermodal backhaul cargo (Hall, 1994o, p. 8A). Although the peso crisis should boost northbound shipments, southbound traffic will decline because Mexican importers have to pay more for US goods (Hall, 1994q, pp. 1A and 8A). Some carriers believe the trade adjustment may help reduce huge equipment imbalances (Hall, 1995a, pp. 1A and 8A).

Aside from the negative effects of the peso devaluation, Mexico's port privatization and infrastructure upgrade programs are having a significant impact on waterborne transportation in the US-Mexico trade. Lykes Lines, for example, began direct service to the Mexican ports of

Altamira and Veracruz two years ago. It initiated this service specifically because of increased productivity at these ports (Fossey, 1994a, pp. 31-33). Lykes Lines' current strategy is to "...route as much cargo as possible through Mexican ports" (Fossey, 1994c, p. 53).

> Today, shipping companies choose ports on the basis of factors such as speed of loading and unloading ships, size of hinterland served, and availability of land transport services to the final destinations desired by shippers (United Nations, 1989, p. 102).

The Lykes service, however, is not as dependent on backhaul cargo as are cross-Gulf traders. Its Mexico service is inter-line with Lykes ships continuing on to Europe, Asia or other regions to pick up additional cargo (Burke, 1994, n.p.). Two other carriers, American President Lines and Sea-Land Service, are now promoting direct, all-water liner service to Mexico in a major change of marketing strategy. Until recently, they sought out land-based intermodal shipments between the US and Mexico specifically to avoid the once corrupt and inefficient Mexican waterfront. Problems with cargo theft and container hijackings on Mexican highways, combined with greater efficiencies at major Mexican container ports, led to the marketing switch (Hall, 1994m, p. 1A). This is a significant milestone for Mexican container ports in their drive to become more competitive in the global marketplace.

> ...[T]he literature suggests that when shippers engage in *carrier selection*, transit time reliability is the most important factor; when evaluating *international water ports*, shippers

> point toward security and capability attributes as the most important factors (Murphy, Dalenberg, and Daley, 1991, p. 179).

APL and Sea-Land are now interested in bidding on major Mexican container port concessions, which were released in March 1995 (Hall, 1995h, p. 1A). They have also expressed interest in the intermodal rail link concessions from the Ports of Veracruz and Manzanillo to Mexico City now that FNM is due to be privatized later in 1995 (Journal Of Commerce, 1995b, p. 2B).

Other ocean carriers are also entering in the US-Mexico trade. They generally offer cross-Gulf relay feeder operations or Mexican inter-line calls on main-line routes between two other countries (Fossey, 1994c, p. 53).

> Until recently ...direct water links between Gulf ports and Mexico proved hard to find. Most of the connections still come a part of larger routes stopping at several different Gulf and Mexican ports before heading out to Europe. With [NAFTA] now approved, however, - and the headache of border congestion expected to become a migraine - the need for a waterborne alternative could bring the Gulf alive with cargo shuttle operations similar to those in Europe (Taylor, 1994a, n.p.).

One of these smaller operators is Americas Marine Express. It began direct, all-water liner service between Memphis, Tennessee and Progreso, Mexico in 1994 based on a 1993 US Maritime Administration report substantiating the feasibility of such a service (Sansbury, 1994b, p. 1B). "The Gulf of Mexico is getting crowded with all the new U.S.-to-Mexico ocean services..." (Traffic Management, 1993a, p. 93A). See Appendix E, p. 338 for steamship and barge lines currently

providing oceanborne container transport services in the US-Mexico market.

US-Mexico Shippers

Trucking dominates the US-Mexico trade due to reasons discussed earlier. Shipper recognition, however, is also another important factor. It partially explains why trucking continues to haul most of the trade's cargo, even where ocean transport would be more efficient (Tirschwell, 1994, p. 5A). Shipper preference is probably the greatest obstacle facing ocean transportation in the 1995 US-Mexico market. There are also substantial cultural differences between Mexico and the US that carriers must take into consideration if they are to effectively compete in the market. See Trunick (1994) for an overview of cultural and logistics factors affecting the US-Mexico trade.

> Water carriers between the U.S. Gulf and Mexico say their biggest problem is changing the mindset of shippers who are accustomed to moving their Mexican cargo by truck or rail. In many cases, carriers say, Mexican cargo booking is controlled by corporate transportation departments responsible for domestic movements. They have established relationships with truckers or railroads and are unaccustomed to dealing with ocean carriers (Bonney, 1993, p. 55).

Some shippers do not utilize ocean transport services because of "...the relatively small lots involved and the lack of information about water options..." (US Department Of Transportation, 1993b, p. 7). Over 60 percent of the shippers in the market say that trucking will probably haul

most of their NAFTA-growth trade. This could be due to the need for services, such as just-in time deliveries, to effectively compete in new markets (Lautsch, 1993, p. 42). Maritime transport has a serious problem with shipper recognition, as evidenced by its 1993 US-Mexico market share of approximately 8.5 percent by value (US Department Of Commerce, 1993b; and author's calculations). "Carriers are so busy watching what their [ocean transport] competition is doing, trying to cut costs and be more efficient, that they haven't paid attention to the industry's image at all." This is why ocean-liner shipping ranked last, relative to air, rail, and trucking, in a 1993 shipper opinion poll (Tirschwell, 1993a, p. 1B).

The goal for ocean-liner managers should be to capture market share from other modes rather than other steamship lines. Carriers need to aggressively market quality services and promote the inherent advantages of ocean shipping if they intend to effectively capture cargo from trucking, rail, and air. There are many ways to improve shipper recognition.

> There's been a tremendous need from U.S. and Canadian suppliers wanting to go into Mexico — they need information about customs requirements, transit times, tracking times, schedules of rates, that sort of thing (Dalton, 1994, p. 24).

Even so, the waterborne commerce market share is so small, in the US-Mexico trade, that the industry's overall position will improve little if ocean carriers focus on capturing cargo from each other. Thus, liner marketing departments

face an uphill battle in the US-Mexico trade. "Exporters so far have shown little inclination to change long-established patterns and switch from all-land to land-sea routes" (Taylor, 1994a, n.p.). Mexican Gulf Line, for example, failed in its attempt to gain shipper recognition. It began US-Mexico service in July 1993 by targeting US export commodities, such as lumber, rice, foodstuffs, various kinds of refrigerated cargo, and cotton. It also targeted US import commodities, such as coffee, vegetables, fresh fruit, beer, and chemicals (Tirschwell, 1993b, p. 8B). Most of these are growing cargoes suitable for containerized transport, which should make them attractive for capture by ocean-liner operators. Regardless, Mexican Gulf Line's US-Mexico service folded in December 1993 because of insufficient cargo volumes.

The failure of Mexican Gulf Line, even when it was targeting appropriate commodities, indicates that shippers are still largely unaware of the benefits inherent to ocean transportation. Another major factor contributing to the demise of Mexican Gulf Line was that Mexican cargo brokers were "...having shippers stipulate in their import permits that cargo must be shipped over an established border crossing, such as Laredo or El Paso" (Burrows, 1994b, p. 29). The unconventional manner in which Mexican ports have developed over the years is yet another reason for limited shipper recognition.

> Most of the Mexican east coast seaports were developed under the influence of P-Mex, the nationally-owned petroleum producer. Containerized goods were moved by rail and continue in this practice, so it is expected that the Mexican business community will need to learn more about waterborne connections of non-petroleum and non-chemical products to the United States (Brohl, 1993, p. 30).

According to Brohl (1993), the best way to capture Mexican cargo is "...through contact with the Mexican transportation community within the Mexican government - federal, state, and local levels - and through such private sector players as freight forwarders, stevedores, and ship operators." See Tirschwell (1994) for an informative assessment of shipper preferences in the US-Mexico trade.

Mexican Peso Crisis

In December 1994, President Zedillo of Mexico declared that the Mexican Peso would no longer be pegged to the US Dollar in an attempt to readjust the overvalued monetary unit. The result was a sudden, 39 percent devaluation of the peso which sent the Mexican economy and foreign investors into disarray. This devaluation has directly affected transportation interests in the US-Mexico trade by raising the cost of US exports to Mexico, reducing Mexican demand for these goods, increasing freight rates, and weakening growth in US shipper/Mexican consignee demand for transport services (Memmott, 1995, p. 1B; and DiBenedetto, 1994, pp. 1A and 8A). US Treasury Undersecretary Lawrence Summers, however, recently stated that "...the North American Free Trade

Agreement is not in jeopardy of unraveling as a result of the financial tumult in Mexico" (Journal Of Commerce, 1995a, p. 2A). Nevertheless, the first six-year period is the most critical period for trade reforms, according to Kate (1992). President Clinton has subsequently put together a $50 billion multilateral financial aid package for Mexico to help diminish investor uncertainty in the Mexican economy and the US-Mexico trade (Maggs and Hall, 1995, p. 1A). Mexico has also undertaken an emergency privatization plan to raise $14 billion that includes accelerated foreign investment opportunities in seaport concessions, airport concessions, power generation operations, and railroad concessions (Hall, 1995h, p. 8A).

Mexico's financial difficulties were not entirely unforeseen. The Mexico Report said in 1993 that Mexico was a "dangerous market" whose economy was "...already beginning a tailspin. Its trade deficit is escalating, its private sector is over its head in debt, and its peso is overvalued" (Thuermer, 1993, p. 36). A 1993 Journal Of Economic Issues article also warned of an impending Mexican currency crisis.

> Even though the country possesses substantial international reserves due to the massive inflow of capital the nation has attracted since 1989, foreign investors could easily move their money out again (given the highly liquid nature of their investments) if they sense that the government is about to devalue to correct the external imbalance. This would leave [Mexico] facing an intractable balance-of-payments problem (Ramirez, 1993, p. 1022).

Most carriers serving Mexico knew the peso was overvalued. They were caught off-guard, however, by the sudden and drastic decline in value. Liner managers are still trying to determine the impact it will have on their operations. Nevertheless, many carriers continue to see strong potential in the US-Mexico liner trade. A Sea-Land Service executive, for example, said that his company still views Mexico as an opportunity market and is not planning any short-term changes in that emphasis. He also stated that the devaluation could mitigate huge south-bound equipment imbalances that have been growing over recent years (Hall, 1995a, pp. 1A and 8A). Mexico also initiated extensive austerity measures in March 1995 to get its economy back on track. These measures, however, will require time take effect (Providence Sunday Journal, 1995, p. A4). The consensus among ocean carriers seems to be that liner operations should continue despite this temporary setback in the trade (DiBenedetto, 1995, p. 2C).

CHAPTER THREE

METHODOLOGY

Historical Study

The historical qualitative research methodology was used to analyze and interpret valid secondary historical data relating to the ocean transport of containerized cargo in the US-Mexico trade. This information was at least once removed from the original source and included books, atlases, directories, academic journals, trade magazines, trade newspapers, computer databases, compact disks (CD-ROM), government publications, and tailored US Government statistical data. The historical methodology was used to isolate dynamic forces in the US-Mexico trade that are affecting ocean-liner transport and to gain new insights into their meaning (Leedy, 1993, p. 223-224). These forces are either beyond a carrier's control (exogenous) or forces the carrier can control or influence (endogenous). Once determined and understood in proper context, they can be accounted for in a carrier's long-term planning strategies.

Historical Data Requirements And Constraints

Relevant dates and associated events obtained during the literature review were analyzed using historical methodology

research designs. These included a chronological listing, which is a simple listing of dates and events, and two dual time line continuums, which temporally compare one set of chronological data to another (Leedy, 1993, pp. 225-228). These procedures were utilized in an attempt to "...understand the meaning of these events, both as to their relationship to each other and to the problem under study" (Leedy, 1993, p. 226).

The act of arraying events in the above formats is not historical research until their meanings, as well as their temporal relationships, are interpreted. It should also be mentioned that "...as historical data stand in perspective at a distance ...from the researcher, they have a tendency to telescope and to become unrealistically crowded upon each other" (Leedy, 1993, p. 228). This is probably due to the more detailed recording of recent events, the dynamic nature of the US-Mexico market over recent years, and the wider selection of literature now available. The purpose of the historical analysis was to provide geographical, political, and economic insights into the US-Mexico trade, with an underlying emphasis on ocean transportation.

> [There are a] ...complex set of political and economic relationships (invisible to the consumer) packed in every crate of tomatoes reaching the U.S. market (Cleaves and Stephens, 1991, p. 199).

Chronological Listing

First, relevant dates and events (1870 to 2008) were listed chronologically according to codes designating them as economic, general transport or waterborne transport-related. This listing was placed in Appendix F, p. 340 due to the large number of events recorded (almost 600). It was also used to get a rough idea of epoch parameters for the remaining historical analyses. The parameters were based on the total number of events utilized, instead of actual periods transition, for figure uniformity. Most of the relevant events used were from the late-1980s until 1995. This created the telescoping effect described above and was overcome by dividing each epoch into an equal number of events for uniformity. The above listing provided a large pool of relevant information from which events, specifically those directly related to the study problem, were extracted for close analysis using dual time line continuums. The general publications containing all dates and events are listed in Appendix B, p. 335. The events were considered to be given facts or common information and were not cited individually. See Assumptions, p. 13.

Dual Time Line Continuum

Key events, based on their relevance to ocean-liner transportation, were taken from the chronological listing for further study. This information was used in two dual time

line continuum analyses. Variable time scales were used to keep the continuums at a manageable size. These analyses were conducted to isolate exogenous and endogenous forces generally affecting ocean-liner transport operations in the US-Mexico trade. The primary dual time line continuum compared major economic and political events to major transportation events (including waterborne transportation) to get an idea of the exogenous forces generally affecting transportation, including ocean transport, in the overall trade. An economic or political event was considered to be major when it directly affected, either positively or negatively, the US-Mexico transport sector, in general. A transportation event was considered to be major when it directly affected the US-Mexico transport sector, in general. These two event categories were considered to be exogenous in nature.

The secondary dual time line continuum compared major transportation events (excluding waterborne transportation) to both major and minor water transport events. This was done to focus on transport-related exogenous and endogenous forces that may be directly affecting maritime transportation in the US-Mexico trade. In this analysis, a transportation event was considered to be major when it had a general, but direct, impact on the ocean transport sector. Waterborne transport events were considered to be major when they affected US-Mexico maritime transportation in general. Water

transport events were considered to be minor when they affected more carrier-specific segments of the maritime transport sector. Each analysis was arrayed into three uniform, temporal epochs to make the study manageable.

Due to the dynamic nature of the US-Mexico market over recent years, the historical study focused primarily on 1989-1995 qualitative information. A brief assessment of the recent Mexican Peso crisis can be found in the Literature Review, p. 48. The period above also approximated the presidency of Carlos Salinas de Gortari (1988-1994), who carried out the most extensive upgrades to Mexico's transportation infrastructure in history. All qualitative information was obtained from the South Dakota State Library, Stanford University, Texas A&M University-Galveston, University of California-Irvine, University of Rhode Island, US Coast Guard Academy, US Department Of Commerce, and US Department Of Transportation.

Ex Post Facto Study

The ex post facto quantitative research methodology was used to analyze and interpret valid secondary statistical data pertaining to the ocean transport of containerized cargo in the US-Mexico trade. An ex post facto study is the "...process of beginning with a phenomenon and regressing to locate the causal factors" (Leedy, 1993, pp. 233 and 305-306). A shift-share statistical model was used to

approximate an ex post facto study by assigning US-Mexico cargo flows to discrete categories for further analysis and interpretation. This model does not, however, determine cause and effect relationships by itself and only approximates an ex post facto study.

Shift-Share Model

The shift-share statistical model, which approximates an ex post facto study, was originally used by economists to reveal employment level shifts in a regional economy (Marti, 1982, p. 241). It was modified for this study to quantitatively assess long-term competition, i.e. between 1989 and 1993, among the various modes of transport in the US-Mexico trade.

Shift-Share Data Requirements

The shift-share model analyzed 1989 and 1993 US Department Of Commerce three-digit SITC commodity statistics by weight, based on the total physical movement of merchandise between the US and Mexico, to provide new insight into the trade's cargo dynamics over time. This type of analysis reveals long-term cargo flow patterns by smoothing out trade fluctuations over time. Thus, a researcher must be careful to choose initial and terminal years without major trade anomalies because they can skew the results. The year 1995, for example, should be avoided in future analyses

because the current Mexican Peso crisis will have a great impact on US-Mexico commerce. Regardless, the initial study year of 1989 was selected because pre-1989 data were not expressly based on the United Nations SITC commodity classification system. It was also chosen because, coincidentally, the Mexican economy had finally reached a period of stabilization by 1989 (Kate, 1992, p. 667). The terminal study year of 1993 was selected to account for steady, five-year, pre-NAFTA growth (from the beginning of 1989 until the end of 1993) in US-Mexico commerce (US Department Of Commerce, 1989; and US Department Of Commerce, 1993b). This study considered the value of the trade's cargo flows only to a limited degree.

Weight analyses are very important to ocean transportation. A MARAD study of US-Mexico waterborne commerce stated that "for water transport, tonnages are a much more important indicator of market size than dollar values of cargo" (US Department Of Transportation, 1993b, p. xi). Weight tends to dictate the nature of capital expenditures on vessel construction, types and quantities of marine cargo containers, types and durations of vessel charter agreements, port infrastructure, and intermodal links. A United Nations publication that assessed foreign trade and ocean transportation in Latin America reaffirmed the importance of weight in world commerce. "The provision of transport services along the world's trading routes is

guided essentially by changes in the physical quantities of goods traded rather than their value" (United Nations, 1989, p. 61). Regardless, commodity value was also addressed to a limited extent because ocean carriers are ultimately in business to earn a profit for their shareholders. At the very least, a carrier must set freight rates that are high enough to cover incurred expenses if it is to remain in business. "Of the numerous factors influencing the formation of freight rates, it is generally acknowledged that the value of the commodity has the greatest significance" (Kendall, 1986, pp. 71 and 280).

This analysis considered only those commodities classified as being excellent or suitable for containerized transport, regardless of whether they regularly move as unitized cargo in liner or tramp service aboard barges, break-bulk ships, neo-bulk vessels, bulk vessels, cargo jets, boxcars, truck trailers, container-on-flatcars, trailer-on-flatcars or in any other configuration (US Department Of Commerce, 1993a, pp. 8-9). General cargo, including minor bulk, was classified as being excellent or suitable for containerized transport according to Couper (1972), United Nations (1987), Traffic World (1993), Journal Of Commerce (1994a), and an assessment of the three and five-digit SITC commodities listed in United Nations (1986). Minor bulk commodities include synthetic resins, miscellaneous chemicals, liquor, and others listed in the sources above.

The Port Authority of New York and New Jersey has developed widely-accepted classification guidelines for determining the suitability of cargo for containerized transport. They are listed below and were also utilized for cargo selection and elimination:

> **Excellent:** Refers to high-cost products with relatively high freights, whose physical characteristics as determined by size and stowage factor (i.e. the ratio between the weight and volume of the cargo) permit them to be efficiently packed in containers. Many products in this category are also highly susceptible to deterioration and theft. Examples are wines and spirits, pharmaceutical products and tobacco.
>
> **Suitable:** Generally includes products of medium value, whose freights are lower than those classed as excellent, and that are somewhat less susceptible to damage and pilferage. Examples are wire products, coffee in sacks and cacao, as well as products that are easily contaminated (flour in bags) and or subject to surcharges in freight rates or port fees (uncured leathers and lampblack).
>
> **Marginal:** Includes products that can be phonically placed in containers that are low in value and for which low freight rates are charged, as well as those of low susceptibility to deterioration or theft. Examples are steel and iron ingots, and unfinished wood.
>
> **Unsuitable:** Products that cannot be physically packed in containers, such as scrap iron, large trucks and structural steel over 40 ft long, or products like sugar or automobiles that can generally be transported more efficiently in large volumes by specialized carriers (United Nations, 1987, p. 26).

All commodities selected for inclusion in the study are listed in Appendix G, p. 358. Major bulk commodities, such as crude oil and grain, as well as essentially large or heavy roll-on/roll-off cargoes like autos, tractors, and bulldozers, were identified utilizing the above procedure and eliminated from the study. This method also removed US-

Mexico pipeline commerce from consideration. See Appendix H, p. 362 for all commodities excluded from the study.

The literature review indicated that substantial quantities of autos, tractors, and heavy equipment now move overseas by marine container (Cantwell, 1992, pp. 4B-5B). In Central America, however, the lack of container transport equipment has made this region "...one of the last strongholds of roll-on, roll-off shipping" (Dunlap, 1993a, p. 9A). Transportación Marítima Mexicana (TMM), for example, is the only western hemisphere-based steamship company still operating specialized neo-bulk automobile carriers (Dunlap, 1993b, p. 4A). In the US-Mexico trade, however, auto shipments still predominantly move by rail on multilevel racks on flat cars (Kaufman, 1994b, p. 5C). Nevertheless, ocean carriers should further investigate the potential of these high-value cargoes in the US-Mexico liner trade even though they were excluded from the study.

US Government Data Constraints

Bureau of the Census foreign trade commodity data were listed by the general mode of transport, i.e. vessel, air, other, at the actual port of import or export (US Department Of Commerce, 1993a, p. 8). This study identified all US-Mexico commodities which could be readily captured for containerized transport and then analyzed each commodity by the mode actually hauling it into or out of the US. The

shift-share model did not consider any intermodal movements which occur on many shipments between the US and Mexico (Fossey, 1994d, pp. 77-81).

The Bureau of the Census, Foreign Trade Division provided data for the shift-share analysis in raw formats consisting of millions of US Dollars and kilograms for 1989 figures and thousands of US Dollars and kilograms for 1993 figures (US Department Of Commerce, 1989; and US Department Of Commerce, 1993b). This discrepancy reduced the study's overall resolution because 1989 commodity statistics in thousands of dollars and kilograms were not available. It should also be mentioned that "...countries are far more careful with their inbound cargo, so the statistics are more useful and accurate" (McCalla, 1992, p. 16). See US Department Of Commerce (1993a) for a complete description of Bureau of the Census trade data and their limitations. These statistics also accounted for Mexican transshipment (US re-export) cargoes, as well as commodities moving in the US-Mexico maquiladora trade. With the latter cargo, only the value added in Mexico was included in US imports statistics when the good returned to the US (Orseney, 1995). Although air and ocean weight data were available for analysis, comparable land data were not. See Appendix I, p. 364 for the format of government data used in the study.

> The basic problem is that the Bureau of the Census of the U.S. Department of Commerce collects and retains foreign commerce tonnage figures only for the air and water modes. For rail and truck

> cargoes, it processes only the dollar values of commodities imported and exported (US Department Of Transportation, 1993b, p. xi).

Researchers have been trying to overcome this problem for years with mixed and often inconsistent results (US Department Of Transportation, 1993b, pp. x and xi). The approach used in this study assumed that truck and rail commodity values per metric ton approximate maritime transport commodity values per metric ton. See Assumptions, p. 12. This value approximation, based on the concept of intermodalism, was required to permit a comparison of the different modes of transport serving the US-Mexico trade. It is always essential to include weight information when analyzing ocean transport trade data for the reasons discussed on pp. 57-58.

Aggregate land transport commodity figures, i.e. those from the combined trucking and rail sectors, were put in a category labeled *other*. These data could not be disaggregated due to the configuration of available government statistics (US Department Of Transportation, 1993b, pp. x and xi). Both 1989 and 1993 *other* weight figures were calculated in metric tons (mt) by commodity as follows:

$$\frac{\text{VESSEL VALUE (US\$)}}{\text{OTHER VALUE (US\$)}} = \frac{\text{VESSEL WEIGHT (mt)}}{\textbf{OTHER WEIGHT (mt)}}$$

This proportion was based on the fifth assumption, p. 12, which infers that these two ratios "...are each composed of *like* quantities" (Van Tuyl, 1932, pp. 146-148). It was not

possible to calculate 1989 land transportation or *other* weight figures for commodities with 1989 vessel value and weight statistics which both equal zero using the above proportion. To overcome this problem, 1993 vessel value and weight data were substituted, where they existed, to approximate both 1989 and 1993 *other* weight figures. This permitted commodities recently captured by ocean transport or commodities displaying new growth to be included in the analysis. Conversely, 1989 vessel value and weight data were used to approximate both 1989 and 1993 *other* weight figures when the reverse situation occurred. Air transport cargo values, however, are typically skewed toward the upper end of most commodity groups due to the mode's unusually high operating costs per ton of cargo hauled. In other words, air transportation is revenue-intensive and mainly attracts high-value, time-sensitive cargoes (Delia-Loyle, 1992, p. 16). Thus, air cargo values were not included to avoid distortion.

Import or export commodities, by mode, that had weight figures of zero and dollar values greater than zero were assigned an interpolated minimum weight of one metric ton. This was done to permit their inclusion in the analysis and was based on the more conservative 1993 data set which is denominated in thousands of US Dollars. Import and/or export commodities by mode that had dollar values of zero and weight figures greater than zero were assigned an interpolated minimum value of $50,000 based on the more conservative 1993

data set. Again, this was done to include them in the shift-share analysis. Commodities with zero vessel values and zero vessel weights in *both* the initial and terminal years were processed, but disregarded, in the analysis.

To set up a shift-share model based on international weight standards, kilograms were converted to metric tons where 1,000 kilograms equal 1 metric ton. Metric tons were then converted to twenty-foot equivalent units or TEUs (a standard measure for container ship capacity) to make the results more meaningful to maritime industry users. The TEU was merely used as a unit of measure familiar to ocean transport managers and implied nothing in regard to air, trucking or rail. Cargo jets, for example, do not handle TEUs; they use special air freight containers. Regardless, the US average tonnage per TEU was 10.91 short tons in 1980 according to Marti (1987). Thus, TEU figures were calculated based on a conversion to metric tons from short tons, where 1 short ton equals 0.907 metric tons. This procedure indicated that ten metric tons (rounded) are basically equal to one TEU (The World Almanac And Book Of Facts 1994, 1993, p. 280). The TEU was subsequently used throughout the study as the primary weight unit based on metric tons.

Shift-Share Analysis

The shift-share model analyzed US-Mexico trade cargo flows by TEUs where one TEU equaled approximately ten metric

tons. There are four general stages in the shift-share analysis. Shift-share basically takes the growth experienced by a commodity over a specific period of time and subdivides it into three categories for further analysis. Each category is described below and was processed with SAS application software on an IBM-compatible microcomputer. See Appendix I, p. 364 for SAS raw data sets and Appendix J, p. 383 for SAS shift-share programs.

The first stage calculated the *trade share factor*. This factor represents the portion of a commodity's overall growth or decline over time, by mode, that can be attributed to *expected* growth. Trade share assumes that a commodity's trade in a particular mode will continue at the same rate in the terminal year (based on the period's average growth rate for all included commodities in all modes) that it was experiencing in the initial year (Marti, 1982, p. 243). In other words, it represents the status quo and market share remains stable. The *trade share factor* was calculated, as follows, where the quotient in parentheses represents the overall trade's average growth rate:

$$\mathbf{TDSHR} = \mathbf{PCPM}_{89}(\mathbf{TACAM}_{93}/\mathbf{TACAM}_{89}) - \mathbf{PCPM}_{89}$$

TDSHR = Total expected growth of a particular commodity in a particular mode serving the US-Mexico trade over a specific period of time *(in TEUs)*.

PCPM = Trade of a particular commodity in a particular mode within an initial or terminal study year *(in TEUs)*.

TACAM = Total trade of all included commodities in all modes within an initial or terminal study year *(in TEUs)*.

The second step calculated the *proportionality shift factor*. Proportionality shift represents the portion of overall growth a commodity experiences over time that can be attributed to market forces exogenous to a particular mode. In other words, steamship lines do not have control over these forces. Market demand in a particular commodity, for example, is exogenous to a carrier. Proportionality shift indicates the dynamic nature of the cargo moving in a trade. A commodity could be fast-growing, slow-growing or declining on a trade-wide basis. A positive proportionality shift indicates that a particular mode is handling a commodity growing faster than the trade-wide average growth rate for all included commodities in all modes. A negative proportionality shift indicates that a certain mode is handling a commodity either declining or growing more slowly than the trade-wide average growth rate for all included commodities in all modes (Marti, 1982, p. 244). The *proportionality shift factor* is a zero sum statistic. It was calculated, as follows, where the quotients in parentheses represent the rates of growth or decline for specific commodities and for the overall trade:

$$\mathbf{PROSFT} = \mathbf{PCPM}_{89}[(\mathbf{PCAM}_{93}/\mathbf{PCAM}_{89}) - (\mathbf{TACAM}_{93}/\mathbf{TACAM}_{89})]$$

where $\sum$PROSFT = 0

PROSFT = Proportional shift of an either fast-growing, slow-growing or declining commodity in a particular mode during a specific period of time *(in TEUs)*.

PCPM = Trade of a particular commodity in a particular mode within an initial or terminal study year *(in TEUs)*.

PCAM = Trade of a particular commodity in all modes within an initial or terminal study year *(in TEUs)*.

TACAM = Total trade of all included commodities in all modes within an initial or terminal study year *(in TEUs)*.

The third step calculated the *differential shift factor*. Differential shift represents the portion of overall growth a commodity experiences over time that can be attributed to market forces endogenous to a particular mode. In other words, ocean carriers do have some control over these forces. This makes the differential shift one of the most important factors in a shift-share analysis. Cargo captured as the result of an effective marketing campaign, for example, is endogenous to a carrier. The differential shift indicates the extent to which a mode captured or lost trade in a particular commodity from or to its competitors, respectively. Cargo captured from other modes is indicated by a positive differential shift. Cargo lost to other modes is indicated by a negative differential shift (Marti, 1982, p. 244). Competing modes thus have inverse differential shift factor signs in a specific commodity. The *differential shift factor* is also a zero sum statistic and was calculated, as follows, where the quotient in parentheses represents the rate of growth or decline for specific commodities.

$$\mathbf{DIFSFT} = \mathbf{PCPM}_{93} - [\mathbf{PCPM}_{89}(\mathbf{PCAM}_{93}/\mathbf{PCAM}_{89})]$$
$$\text{where } \Sigma\text{DIFSFT} = 0$$

DIFSFT = Differential shift of a particular commodity to or from a particular mode during a specific period of time *(in TEUs)*.

PCPM = Trade of a particular commodity in a particular mode within an initial or terminal study year *(in TEUs)*.

PCAM = Trade of a particular commodity in all modes within an initial or terminal study year *(in TEUs)*.

Finally, the *total shift factor* was determined. It indicates the overall dynamic shift of a commodity into and out of a mode between the initial and terminal study years. Total shift is the sum of a mode's proportionality and differential shifts in a particular commodity. It merely highlights the dual effect of the latter two shifts on a specific commodity (Marti, 1994). The *total shift factor* was calculated, as follows:

$$\textbf{TOTSFT} = \textbf{PROSFT} + \textbf{DIFSFT}$$
$$\text{where } \Sigma \text{TOTSFT} = 0$$

TOTSFT = Total dynamic shift of a particular commodity into or out of a particular mode between the initial and terminal study years *(in TEUs)*.

PROSFT = Proportionality shift, which is exogenous to a carrier *(in TEUs)*.

DIFSFT = Differential shift, which is endogenous to a carrier *(in TEUs)*.

The shift-share output, in TEUs, was randomly checked for accuracy with the formula shown below (Marti, 1994). The sum in parentheses represents the overall growth or decline experienced by a commodity in all modes between the initial and terminal study years. This formula readily exposed any data or format problems.

$$\textbf{PCAM}_{93} = \textbf{PCAM}_{89} + (\textbf{TDSHR} + \textbf{PROSFT} + \textbf{DIFSFT})$$

PCAM = Trade of a particular commodity in all modes within an initial or terminal study year *(in TEUs)*.

TDSHR = Trade share, which is the sum of all modal trade shares in a particular commodity *(in TEUs)*.

PROSFT = Proportionality shift, which is the sum of all modal proportionality shifts in a particular commodity *(in TEUs)*.

DIFSFT = Differential shift, which is the sum of all modal differential shifts in a particular commodity *(in TEUs)*.

The resulting trade share, proportionality shift, differential shift, and total shift factors, along with other key information, were analyzed in-depth to determine cargo capture trends in the US-Mexico market. The following logic was used to assess each three-digit SITC commodity, by mode, in conjunction with the historical study. These scenarios cover all import and export commodities with either positive or negative total shift factors:

SHIFT-SHARE SCENARIOS
(BY COMMODITY)

1. With a (+) PROSFT and (+) DIFSFT, a particular mode is specializing in a regionally fast-growing commodity and is capturing this commodity from other modes. It represents a 'best-case' scenario. A carrier should adopt an aggressive policy to ensure continued long-term growth.

2. With a (+) PROSFT and (-) DIFSFT, a particular mode is specializing in a regionally fast-growing commodity but is losing market share to other modes. It represents a 'long-term potential' scenario. Decision-makers should immediately initiate damage control measures to stop the flight of cargo and quickly develop policies to promote long-term growth.

3. With a (-) PROSFT and (+) DIFSFT, a particular mode is specializing in a regionally slow-growing or declining commodity but is capturing market share from other modes. This carrier may want to maximize any remaining benefits with a short-term policy designed to capture any remaining market share. Cargo captured, however, could eventually cease with one mode carrying all of the commodity.

4. With a (-) PROSFT and (-) DIFSFT, a particular mode is specializing in a regionally slow-growing or declining commodity and is losing market share to other modes in the trade. This represents a 'worst-case' scenario. A carrier should abandon such a commodity and invest its limited resources in one which has a (+) PROSFT, that is, a commodity which is growing in the US-Mexico trade (Marti, 1982, pp. 244-245).

CHAPTER FOUR

HISTORICAL ANALYSIS

Chronological Listing

To adequately understand the qualitative economic and political dynamics affecting ocean transportation in the US-Mexico trade, it was necessary to evaluate the market over time. This was an important part of the study because the impact of various political, cultural, geographic, and economic events on maritime transportation may not be readily apparent at first glance. As a sum, however, they directly affect US-Mexico ocean-liner operations and must be considered when developing long-term marketing strategies.

> The undercurrents of trade are the political and cultural evolution of societies (McKinnon, 1992, p. 40).

All events considered relevant to the study were arrayed in a single chronology to create a pool of information from which key events were extracted for further analysis. This was done twice using dual time line continuums. The chronology was placed in Appendix F, p. 340 due to its large size. These events were considered to be given facts or common information and were not individually cited. The historical analysis was used to gain new insights into US-Mexico maritime commerce.

Primary Dual Time Line Continuum

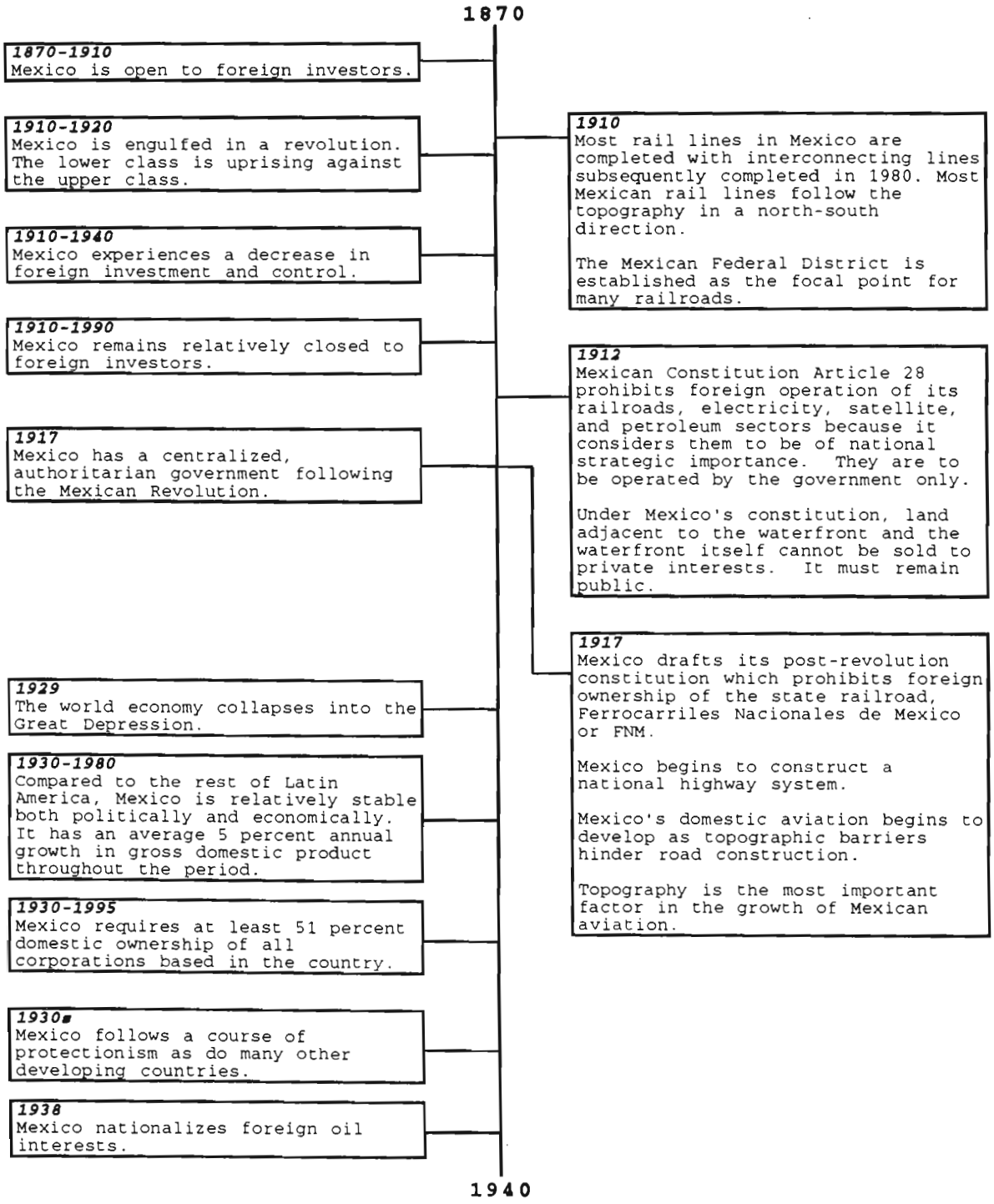
The first continuum, as described in the methodology, arrayed major economic events against major transportation events (including waterborne transportation) by date of occurrence. The primary objective was to reveal major exogenous forces from the overall chain of relevant events that may be directly affecting maritime transportation in the US-Mexico trade. It was also necessary to concurrently interpret their significance to the study problem. This portion of the overall analysis, however, did not attempt to explain each event in detail. The continuum was partitioned into three separate epochs, each comprised of a relatively uniform number of events, for further analysis.

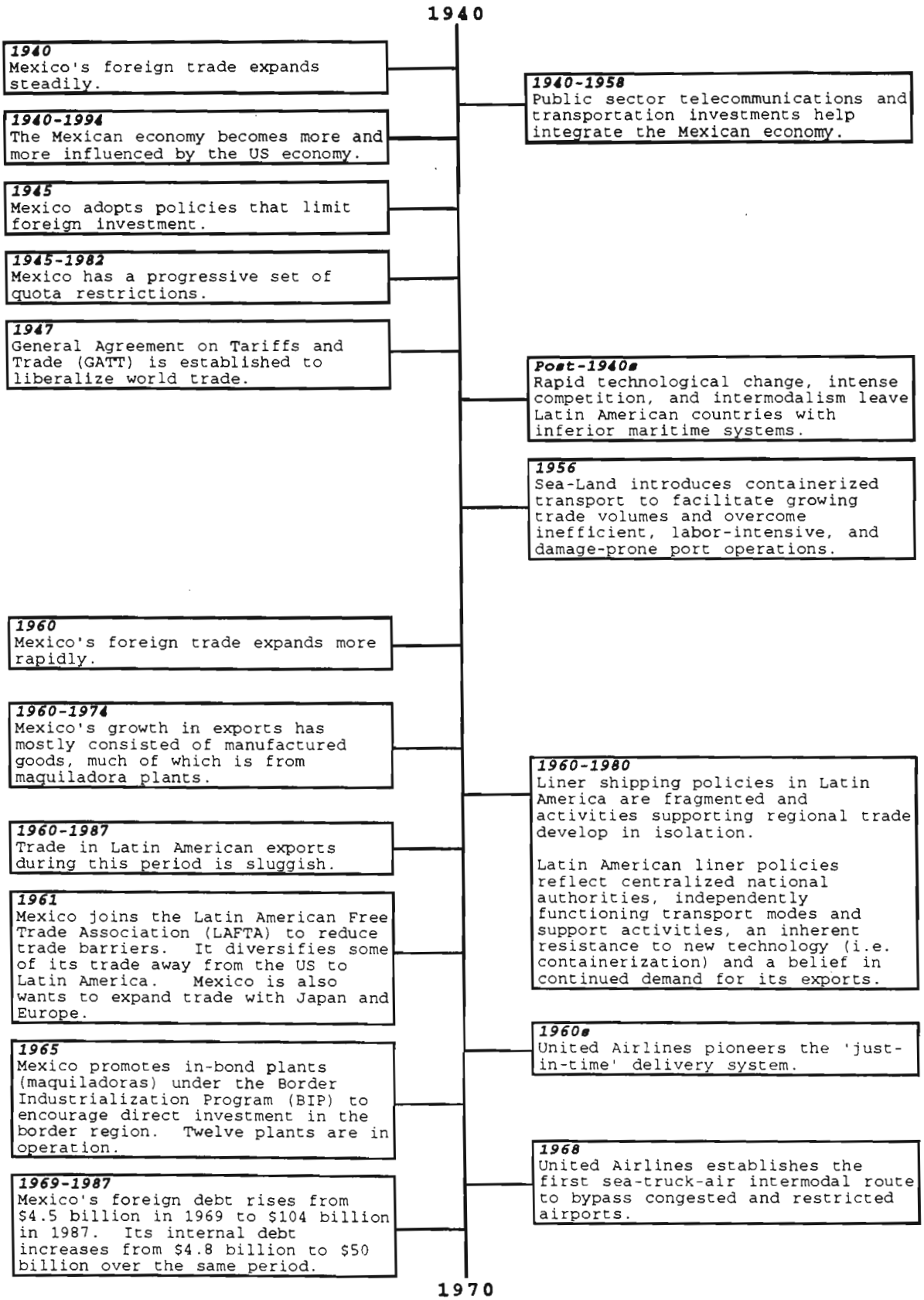
Epoch One (1870-1986)

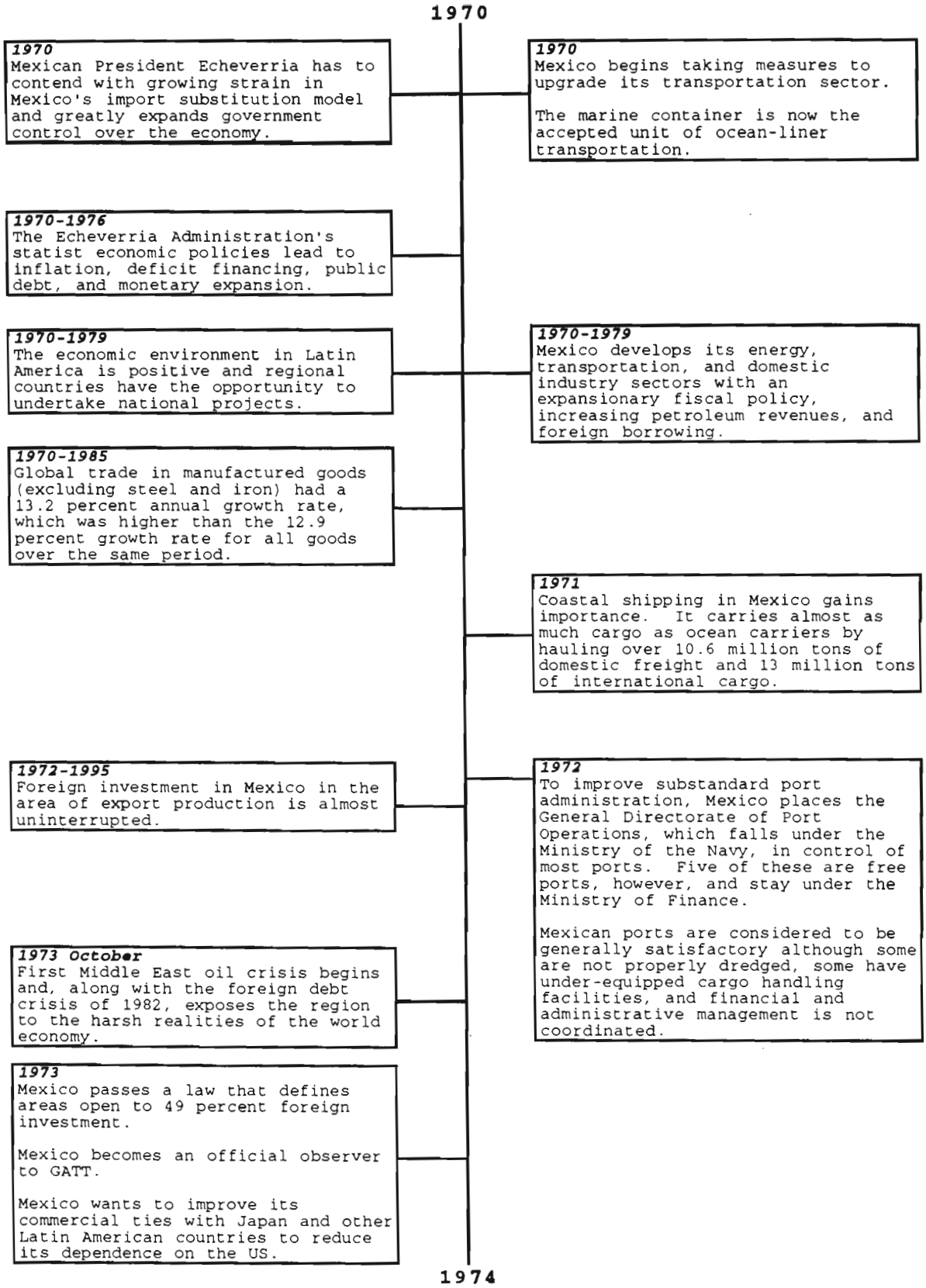
Epoch One, which comprised the years 1870 to 1986 on a variable time scale, was analyzed first. See Figure 2. During the late 19th century until 1910, the Mexican economy was apparently developing along relatively capitalistic lines, which indicated a high level foreign control. The Mexican upper class and foreign interests, however, ultimately went too far in exploiting the lower classes and state resources. The Mexican Revolution erupted in 1910, which eventually led to the installation of a centralist government supported by a majority of the population. It

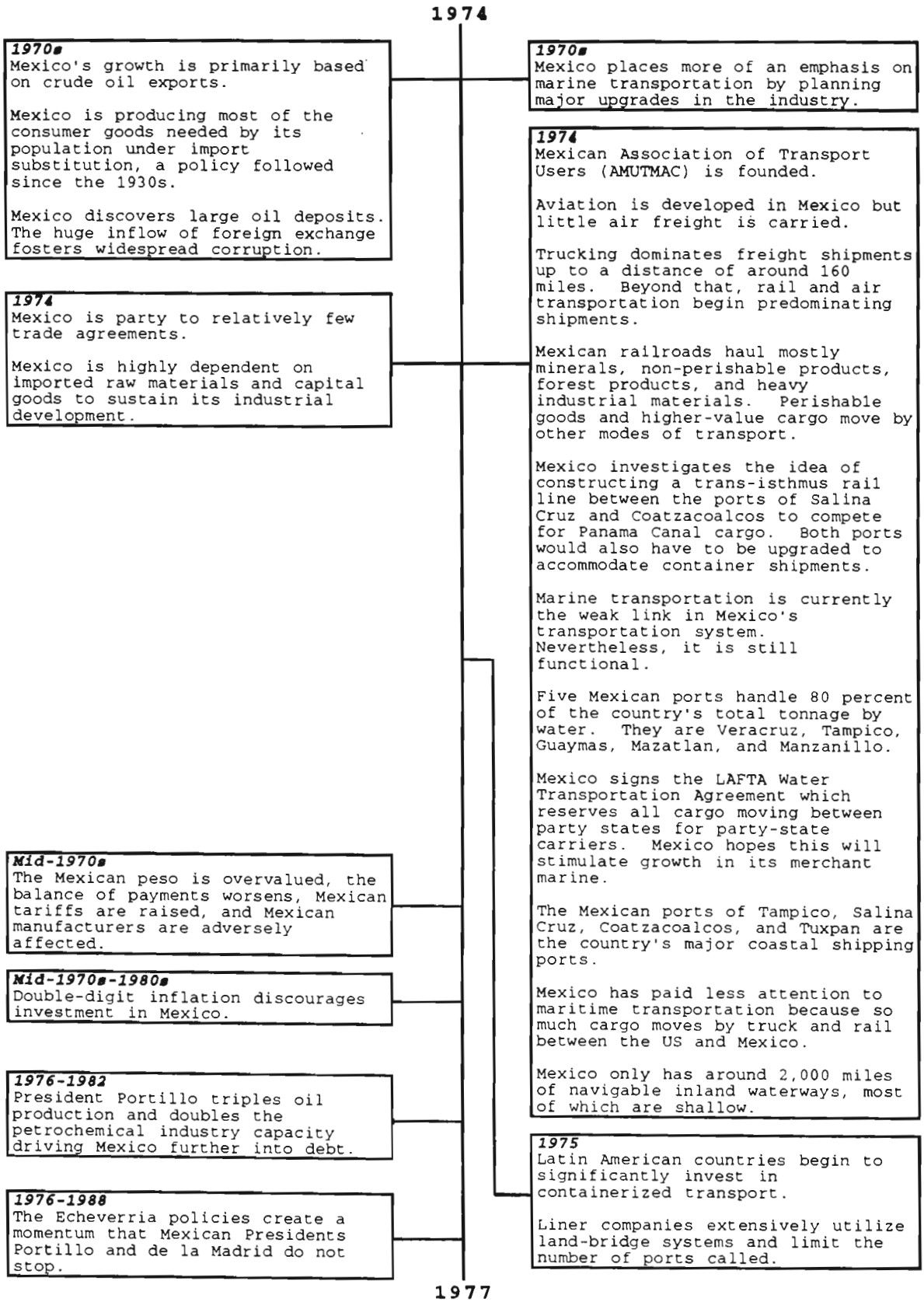
FIGURE 2

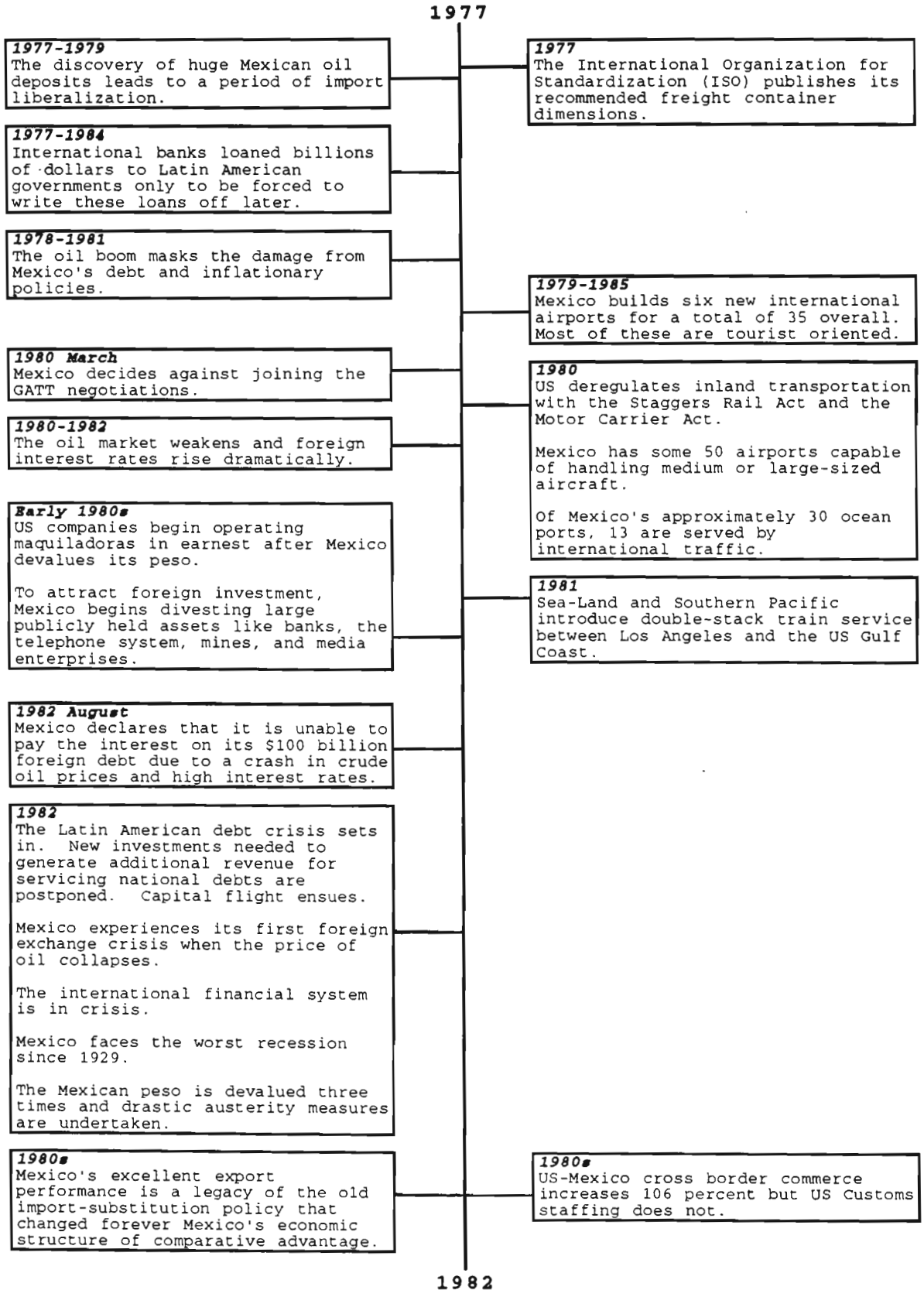
PRIMARY DUAL TIME LINE CONTINUUM (1870-1986)
(EPOCH ONE - BY DATE AND EVENT)




1940
1940
Mexico's foreign trade expands steadily.
1940-1994
The Mexican economy becomes more and more influenced by the US economy.
1945
Mexico adopts policies that limit foreign investment.
1945-1982
Mexico has a progressive set of quota restrictions.
1947
General Agreement on Tariffs and Trade (GATT) is established to liberalize world trade.
1940-1958
Public sector telecommunications and transportation investments help integrate the Mexican economy.
Post-1940s
Rapid technological change, intense competition, and intermodalism leave Latin American countries with inferior maritime systems.
1956
Sea-Land introduces containerized transport to facilitate growing trade volumes and overcome inefficient, labor-intensive, and damage-prone port operations.
1960
Mexico's foreign trade expands more rapidly.
1960-1974
Mexico's growth in exports has mostly consisted of manufactured goods, much of which is from maquiladora plants.
1960-1987
Trade in Latin American exports during this period is sluggish.
1961
Mexico joins the Latin American Free Trade Association (LAFTA) to reduce trade barriers. It diversifies some of its trade away from the US to Latin America. Mexico is also wants to expand trade with Japan and Europe.
1965
Mexico promotes in-bond plants (maquiladoras) under the Border Industrialization Program (BIP) to encourage direct investment in the border region. Twelve plants are in operation.
1969-1987
Mexico's foreign debt rises from $4.5 billion in 1969 to $104 billion in 1987. Its internal debt increases from $4.8 billion to $50 billion over the same period.
1960-1980
Liner shipping policies in Latin America are fragmented and activities supporting regional trade develop in isolation.
Latin American liner policies reflect centralized national authorities, independently functioning transport modes and support activities, an inherent resistance to new technology (i.e. containerization) and a belief in continued demand for its exports.
1960s
United Airlines pioneers the 'just-in-time' delivery system.
1968
United Airlines establishes the first sea-truck-air intermodal route to bypass congested and restricted airports.
1970


1970
1970
Mexican President Echeverria has to contend with growing strain in Mexico's import substitution model and greatly expands government control over the economy.
1970
Mexico begins taking measures to upgrade its transportation sector.
The marine container is now the accepted unit of ocean-liner transportation.
1970-1976
The Echeverria Administration's statist economic policies lead to inflation, deficit financing, public debt, and monetary expansion.
1970-1979
The economic environment in Latin America is positive and regional countries have the opportunity to undertake national projects.
1970-1979
Mexico develops its energy, transportation, and domestic industry sectors with an expansionary fiscal policy, increasing petroleum revenues, and foreign borrowing.
1970-1985
Global trade in manufactured goods (excluding steel and iron) had a 13.2 percent annual growth rate, which was higher than the 12.9 percent growth rate for all goods over the same period.
1971
Coastal shipping in Mexico gains importance. It carries almost as much cargo as ocean carriers by hauling over 10.6 million tons of domestic freight and 13 million tons of international cargo.
1972-1995
Foreign investment in Mexico in the area of export production is almost uninterrupted.
1972
To improve substandard port administration, Mexico places the General Directorate of Port Operations, which falls under the Ministry of the Navy, in control of most ports. Five of these are free ports, however, and stay under the Ministry of Finance.
Mexican ports are considered to be generally satisfactory although some are not properly dredged, some have under-equipped cargo handling facilities, and financial and administrative management is not coordinated.
1973 October
First Middle East oil crisis begins and, along with the foreign debt crisis of 1982, exposes the region to the harsh realities of the world economy.
1973
Mexico passes a law that defines areas open to 49 percent foreign investment.
Mexico becomes an official observer to GATT.
Mexico wants to improve its commercial ties with Japan and other Latin American countries to reduce its dependence on the US.
1974


1974
1970s
Mexico's growth is primarily based on crude oil exports.
Mexico is producing most of the consumer goods needed by its population under import substitution, a policy followed since the 1930s.
Mexico discovers large oil deposits. The huge inflow of foreign exchange fosters widespread corruption.
1974
Mexico is party to relatively few trade agreements.
Mexico is highly dependent on imported raw materials and capital goods to sustain its industrial development.
Mid-1970s
The Mexican peso is overvalued, the balance of payments worsens, Mexican tariffs are raised, and Mexican manufacturers are adversely affected.
Mid-1970s-1980s
Double-digit inflation discourages investment in Mexico.
1976-1982
President Portillo triples oil production and doubles the petrochemical industry capacity driving Mexico further into debt.
1976-1988
The Echeverria policies create a momentum that Mexican Presidents Portillo and de la Madrid do not stop.
1970s
Mexico places more of an emphasis on marine transportation by planning major upgrades in the industry.
1974
Mexican Association of Transport Users (AMUTMAC) is founded.
Aviation is developed in Mexico but little air freight is carried.
Trucking dominates freight shipments up to a distance of around 160 miles. Beyond that, rail and air transportation begin predominating shipments.
Mexican railroads haul mostly minerals, non-perishable products, forest products, and heavy industrial materials. Perishable goods and higher-value cargo move by other modes of transport.
Mexico investigates the idea of constructing a trans-isthmus rail line between the ports of Salina Cruz and Coatzacoalcos to compete for Panama Canal cargo. Both ports would also have to be upgraded to accommodate container shipments.
Marine transportation is currently the weak link in Mexico's transportation system. Nevertheless, it is still functional.
Five Mexican ports handle 80 percent of the country's total tonnage by water. They are Veracruz, Tampico, Guaymas, Mazatlan, and Manzanillo.
Mexico signs the LAFTA Water Transportation Agreement which reserves all cargo moving between party states for party-state carriers. Mexico hopes this will stimulate growth in its merchant marine.
The Mexican ports of Tampico, Salina Cruz, Coatzacoalcos, and Tuxpan are the country's major coastal shipping ports.
Mexico has paid less attention to maritime transportation because so much cargo moves by truck and rail between the US and Mexico.
Mexico only has around 2,000 miles of navigable inland waterways, most of which are shallow.
1975
Latin American countries begin to significantly invest in containerized transport.
Liner companies extensively utilize land-bridge systems and limit the number of ports called.
1977


1977
1977-1979
The discovery of huge Mexican oil deposits leads to a period of import liberalization.
1977-1984
International banks loaned billions of dollars to Latin American governments only to be forced to write these loans off later.
1978-1981
The oil boom masks the damage from Mexico's debt and inflationary policies.
1980 March
Mexico decides against joining the GATT negotiations.
1980-1982
The oil market weakens and foreign interest rates rise dramatically.
Early 1980s
US companies begin operating maquiladoras in earnest after Mexico devalues its peso.
To attract foreign investment, Mexico begins divesting large publicly held assets like banks, the telephone system, mines, and media enterprises.
1982 August
Mexico declares that it is unable to pay the interest on its $100 billion foreign debt due to a crash in crude oil prices and high interest rates.
1982
The Latin American debt crisis sets in. New investments needed to generate additional revenue for servicing national debts are postponed. Capital flight ensues.
Mexico experiences its first foreign exchange crisis when the price of oil collapses.
The international financial system is in crisis.
Mexico faces the worst recession since 1929.
The Mexican peso is devalued three times and drastic austerity measures are undertaken.
1980s
Mexico's excellent export performance is a legacy of the old import-substitution policy that changed forever Mexico's economic structure of comparative advantage.
1977
The International Organization for Standardization (ISO) publishes its recommended freight container dimensions.
1979-1985
Mexico builds six new international airports for a total of 35 overall. Most of these are tourist oriented.
1980
US deregulates inland transportation with the Staggers Rail Act and the Motor Carrier Act.
Mexico has some 50 airports capable of handling medium or large-sized aircraft.
Of Mexico's approximately 30 ocean ports, 13 are served by international traffic.
1981
Sea-Land and Southern Pacific introduce double-stack train service between Los Angeles and the US Gulf Coast.
1980s
US-Mexico cross border commerce increases 106 percent but US Customs staffing does not.
1982

1982

1982-1988
Investment in Mexico's infrastructure is more or less suspended as the country tries to cope with high inflation and a huge foreign debt.

Mexican President de la Madrid is in office. He initiates economic reform because the old system has failed.

The average Mexican's purchasing power is reduced by 45 percent due to inflation.

1982-1992
Mexican Presidents de la Madrid and Salinas have to alienate strong labor unions associated with the PRI in order to turn Mexico's economy around.

Mexican Presidents de la Madrid and Salinas de Gortari turned a budget deficit into a surplus, privatized many state-owned industries, and reduce many trade barriers.

The number of state-owned Mexican firms declines from 1,555 to 217. Many are bought by foreign investors.

1983
Mexico starts lifting trade barriers and its international commerce begins a new phase of growth.

1984
Mexican President de la Madrid's austerity program is successful and the country is now advancing towards a solid economic recovery.

1984-1994
The world experiences a globalization of markets and economies. Many companies downsize to improve productivity. Technologically driven advances occur rapidly demanding constant change in the world marketplace.

Mid-1980s
Mexico's maximum tariff level is 100 percent.

1985-1989
Mexican import licenses are phased out to establish a more uniform type of protection through tariffs.

Post-1982
Transportation costs have increased steadily since 1982.

1984
US Shipping Act of 1984 is adopted and, along with the 1980 deregulation of inland transport, removed bureaucratic constraints between modes of transport, improved productivity, and encouraged intermodalism.

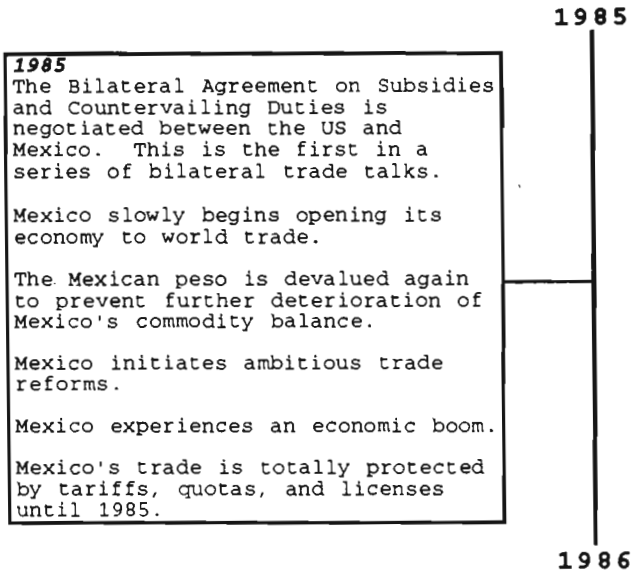
Mexican ports handle less than 100,000 TEUs.

1984-1994
Mexico's corrupt and inefficient port system cause land border crossings to rapidly grow.

1985
Major Mexican highways are located primarily in the central part of the country and follow a north-south orientation along the mountains in the north.

Mexico has 12 major seaports, each handling over 1 million tons of international cargo in 1985.

1985



Sources: See Appendix B, p. 335 for a list of general literature reviewed.

reflected a nation that had strong nationalistic tendencies and one that also rejected the basic premise of capitalism. Mexico's general distrust of foreign investors and the upper class, following many years of exploitation, had a major impact on the country's economic and transport system development. Mexican Constitutional Articles 27 and 28, for example, clearly indicated that foreign investors were not trusted. These articles continue to keep waterfront properties in the public domain and prohibit foreign ownership of industries considered to be of strategic national importance. Such industries include energy, petroleum, and until January 1995, the Mexican national railroad. Articles 27 and 28 have been a major impediment to the development of a logical, efficient, and internationally competitive Mexican transportation network. Nationalism was, and still is, a major cause of the substandard condition of Mexico's transportation system.

Following the revolution, Mexico's authoritarian and highly centralized government wanted to maintain discipline over the economy to prevent a repeat of pre-revolutionary conditions. It began expanding its limited highway and railroad networks to integrate the country. This was done more to facilitate state control than to accommodate international commerce. Most of Mexico's major highways and rail lines developed in a north-south orientation, following the topography of the Sierra Madre Occidental mountain range.

The major focus on highways and railroads seems to have sidelined Mexican port development until at least the 1970s. The government apparently considered maritime transportation to be of lesser importance to integrating the country. Mexican coastal shipping did not even begin substantial growth until the 1970s. Mexican air transport also began developing at this time, mainly as a way to overcome topographical barriers. Nevertheless, it was relegated to a position of lesser importance along with maritime transportation. From early on, Mexico's population became more dependent on roads and railways than on water and air transportation. These events were the initial forces that shaped today's Mexican transport system.

In 1929, the world economy collapsed into the Great Depression. At this time, Mexico adopted a program of import substitution in an effort to insulate itself from external economic forces, as well as to provide the country with a higher level of self-sufficiency. This policy led to a long period of relative stability (1930-1980), compared to other Latin American countries. Mexico focused on import substitution until the early-1980s, when the Mexican economy crashed. This was due to the inherent inefficiencies stemming from this policy and other major problems in the world economy. Anti-foreign sentiments were still strong in the 1930s, as evidenced by official constraints on foreign ownership and the nationalization of Mexico's oil industry in

1938. Mexico's protectionist import substitution policy subordinated international commerce and naturally precluded the need for a well-planned, efficient, market-based transport system. Import substitution was one of the major reasons that Mexico has had a substandard transportation network throughout most of the twentieth century.

In the 1940s, Mexico began improving its communications and transportation networks to further integrate the economy. It was also becoming more dependent on materials imported from the United States at that time. Mexico extended its rail and highway connections to the US border to facilitate imports of essential capital goods and raw materials, which were needed to sustain Mexican industrial development. After the 1940s, most Latin American countries neglected their maritime sectors, while developed countries invested extensively in new shipping and port technology. Competition for liner cargo was becoming intense and the best way to capture it was through the use of advanced equipment. Sea-Land, for example, introduced containerized transportation to the world in 1956, which was generally adopted throughout most developed countries by 1970. Mexico and the rest of Latin America, however, continued to resist containerization well into the 1970s. They did so primarily because of its capital-intensive nature and found themselves with maritime sectors unable to effectively compete in global trade. The fact that Mexico rejected containerized transport for so long

is another reason why Mexican general cargo facilities have been unable to operate at international levels of efficiency over recent years. Moreover, US-Mexico maritime transportation was pushed further into the background during the 1940s and 1950s when Mexican road and rail infrastructure upgrades took place to facilitate the increasing flow of essential imports from the United States.

Mexican foreign trade, which was predominantly with the US in manufactured goods, began to rise steadily in the 1960s. This growth came primarily from the maquiladora or in-bond manufacturing plants. They were set up along the border to stimulate economic activity through limited foreign investment. These plants were open to foreign investment and were located in a zone along the US border to isolate foreign influence. Throughout the 1960s, maquiladora operations rapidly became Mexico's major source of higher-quality manufactured exports. The concentration of the maquiladora industry along the US-Mexico border meant that shippers and consignees generally dealt with trucking and rail firms since they had little need for maritime transportation. This led to an early development of shipper/consignee relationships with rail and trucking firms that continues today. Latin American exports between the 1960s and 1980s, however, generally remained sluggish due to their poor quality. This was a direct result of import substitution policies, which were a serious setback for maritime transportation.

Production of these goods under free-market conditions would have improved their quality and thus external demand. Ocean transportation could have moved these higher-quality exports, had they existed, because of the geographical limitations of non-water modes of transport in the region. Mexico's import substitution policy basically implied that no incentive existed to invest in capital-intensive projects, like a major container port, because the country was internally producing most of its consumer goods; cargoes that would normally be prime targets for containerized transport. Thus, the development of maquiladora plants, along with the negative effects of import substitution and a continued resistance to new technology, further diminished the importance of maritime transportation in Mexico during the 1960s.

In the early-1970s, the faults of import substitution became apparent and President Echeverria had to take action to counter them. Instead of switching to a free-market economy, however, he expanded governmental control over the Mexican economy and increased tariffs to protect domestic production. These measures had a negative overall effect on the Mexican manufacturing sector. More governmental control drastically increased deficit spending, generated skyrocketing inflation, and created a huge public debt. Mexico's economic environment was generally positive throughout the 1970s, but the government resorted to foreign borrowing to fuel and expand the economy. President

Echeverria passed a law at that time designating specific areas open to foreign investment. He was particularly interested in promoting the maquiladora industry. This sector was different from the domestic Mexican manufacturing sector in that it produced higher-quality output. Maquiladora operations were very beneficial to the trucking sector. Rail continued to haul mainly raw materials and heavy industrial capital goods until the late-1980s. Air cargo was still minimal at this time.

President Echeverria wanted to diversify trade towards other Latin American countries and Japan to lessen Mexico's dependence on the US. The Mexican government thus showed more interest in its maritime system during the late-1960s and early-1970s. Nevertheless, it continued to resist the internationally accepted method of containerized transport until the mid- to late-1970s, when it installed some container handling equipment at several ports. Aside from this, Mexico's coastal shipping expanded rapidly during the early-1970s, compared to conventional ocean transportation. Infrastructure was upgraded in various Mexican ports to accommodate the growth in coastal trade under an expansionary fiscal policy. These investments made the ports functional, but did little to make Mexico truly competitive in global commerce because they did not include container handling facilities and intermodal connections. Mexico also changed port control from the Ministry of Finance to the Ministry of

the Navy to improve substandard port administration. The five largest free ports at that time, however, stayed under the control of the Ministry of Finance. They were Veracruz, Tampico, Manzanillo, Mazatlán, and Guaymas. These ports handled 80 percent of the country's total waterborne cargo flows at that time. Mexican ports were generally involved in fishing, bulk cargo, and break-bulk operations until at least 1975. During the mid- to late-1970s, however, Mexico was forced to invest in container equipment to compete with expanding land-bridge systems in the US and elsewhere.

Prior to the mid-1990s, Mexico utilized US land-bridge connections, which were already established and merely extended south, to handle most of its foreign containerized cargo flows. US container ports basically served as a surrogate port system until the mid-1990s because of their existing higher capacity, greater efficiency, and superior intermodal connections. This situation evolved because Mexican ports had the physical capacity to handle only lower volumes of containerized cargo. The country was still highly dependent on imported raw materials and capital goods throughout the last half of the twentieth century to sustain its industrial base. Mexican ports were mainly developed to handle raw materials and facilitate primary production. At this point, water transportation was the weak link in the Mexican transport system.

Huge oil deposits were discovered in Mexico during the late-1970s. At that time, large inflows of foreign petroleum revenue led to widespread corruption throughout Mexico, including the Mexican port system. The most significant problems were at the already inefficient general cargo facilities. Once the Mexican economy became petroleum-based, however, there were incidents of cargo pilferage, extensive corruption, and outright armed robberies to contend with, as well. The 1970s were a significant phase in the development of Mexican ports because shippers, consignees, and even ocean carriers all went out of their way to avoid the country's waterfront. Moreover, trucking and rail handled most of Mexico's growing international container traffic, which had to be transshipped through US ports due to the lack of appropriate port infrastructure in Mexico. General cargo shippers and consignees typically avoided water transportation in the US-Mexico trade either because they were uneasy with shipping cargo through the corrupt Mexican waterfront or they were unaware of maritime connections in the US-Mexico trade.

Most of the growth in Mexico's economy during the 1970s was based on petroleum exports, not manufactured goods. This had one positive effect on manufacturing, however, in that Mexico adopted a new policy of import liberalization in 1977 to provide the public with better access to foreign goods. Mexico's national oil company, Petroleos Mexicanos or

PEMEX, dominated port development on the Gulf coast during the 1970s. PEMEX had top priority when it came to Mexico's merchant fleet and port development projects because of its tremendous revenue-generating capacity. PEMEX was, and still is, a cash cow for the Mexican government. Regardless, Mexico's balance of payments worsened in the late-1970s and President Portillo tripled oil production to compensate. He wound up driving Mexico even further into debt by doing so. By 1980, the Mexican economy was headed for disaster. Its expansionary monetary policy had the unintentional effect of locking the country into a high-risk dependency on petroleum revenues. The country was basically addicted to oil revenue at a time when global trends were shifting towards manufacturing. Tremendous petroleum revenues masked the underlying problems of Mexico's huge foreign debt and high inflation, which were caused by an expansionary fiscal policy in the first place, until it was too late to counter the impending crisis.

Large, expansionary PEMEX projects continued until the bottom fell out of the international oil market in the early-1980s. The Mexican government was forced to skim PEMEX revenues to make payments on its huge foreign debt. This left the oil company ill-equipped to adapt to the changing market and ultimately resulted in diminished production. At that time, however, the manufacturing sector started becoming more important to Mexico's economy than petroleum. In 1982,

the Latin American debt crisis set in and Mexico fell into chaos. The government declared it was unable to make payments on its $100 billion foreign debt because of a weak oil market an the high interest rates, which resulted from the global financial crisis in 1982. Mexican President de la Madrid was in office at that time and initiated sweeping economic reforms and austerity measures. The old system of import substitution had failed.

President de la Madrid devalued the peso three times in 1982 and again in 1985 to prevent a further worsening of the country's balance of trade. Between 1982 and 1992, Mexico sold off large numbers of publicly operated companies, such as mines, to attract foreign investment. This divestment, however, did not include transportation assets, which probably would have made it easier for Mexico to pull itself out of the debt crisis. Foreign investment and expertise in aviation, rail, trucking, and maritime transportation could have provided the country with a more competitive transportation system back in the 1980s. This did not occur until well into the 1990s and is still taking place. Regardless, the Mexican Constitution and nationalism ruled out such action at that time. Most infrastructure upgrade projects in Mexico were put on hold until the end of the 1980s, while Mexican Presidents de la Madrid and Salinas labored to turn the economy around. Thus, Mexican general cargo ports remained largely unchanged between the late-1970s

and 1989. President de la Madrid's austerity measures, however, were successful by 1985 and the Mexican economy was on its way to a solid recovery. He also began to lift trade barriers at that time in an effort to invigorate Mexican foreign commerce.

Mexico's new emphasis on foreign trade, which was predominantly with the US, led to huge growth at US-Mexico land border crossings. This was mainly caused by new maquiladora operations that directly resulted from the devalued peso. It was also caused by shipper desire to avoid the corrupt Mexican waterfront. The remainder of Mexico's manufacturing sector was also in good condition after being protected and allowed to develop for so long under import substitution. The Mexican economy experienced a boom in its manufacturing sector during the mid-1980s due to increased productivity and higher quality exports. This was encouraging for ocean-liner operators, who depend on this type of cargo. Mexico also began serious trade negotiations with the United States in the mid-1980s regarding countervailing duties and subsidies. Such negotiations were significant because Mexico had been party to relatively few trade agreements before then.

During the 1980s, the world was experiencing a global integration of economies and markets driven by rapid changes in technology. Nevertheless, Mexico lagged behind in regard to its transportation network. The country had to

predominantly rely on more efficient US ports, trucking, double-stack train services, and other newly-developed intermodal configurations to handle its foreign container flows. Nevertheless, US-Mexico commerce increased by 106 percent during the 1980s. This increasing trade put a tremendous strain on the border. Customs and border infrastructure improvements did not keep pace, which led to considerable congestion at border crossings. This congestion, however, would later work to the advantage of ocean transportation. Mexico's ports were beginning to handle significant numbers of containers by the mid-1980s. The Mexican port system had a throughput of almost 100,000 TEUs in 1984. This was not a tremendous number of containers when compared to the volume of Mexican-trade containers moving through the US port system (with accompanying intermodal transfers). Nevertheless, it was a still big step forward for US-Mexico maritime transportation. Mexican container ports were finally handling, at the very least, significant numbers of marine containers after decades of resisting containerization. The Mexican port system, however, was still corrupt and inefficient. This problem continued until the government broke the grip of powerful labor unions and opened the system to private investment and competition in the late-1980s and early-1990s.

Epoch Two (1986-1994)

Epoch Two was analyzed next and comprised the years 1986 to 1994 on a variable time scale. See Figure 3. In the mid-1980s, Mexican President de la Madrid took extensive measures to turn the country's economy around. Mexico also joined GATT, began opening up to foreign investment, and made drastic changes in its fiscal policy during 1986. For the first time, Mexican non-petroleum exports outpaced the country's petroleum exports by value. This was a very promising development for ocean-liner operators since they predominantly depend on general cargo flows. Even though Mexican inflation was still high, the maquiladora industry was rapidly growing and the privatization of Mexican state-owned enterprises was increasing. Also, extensive trade liberalization policies were taking effect and US exports to Mexico were on the rise. In 1988, Mexico experienced a surge in consumer imports due to the increasing prosperity. Concern about even higher inflation, however, arose in the Mexican government. Regardless, traffic began picking up in the Mexican transportation sector during 1988. Mexican ports handled 217,000 TEUs of cargo, which more than doubled the 1984 flows of almost 100,000 TEUs.

President Salinas took over the presidency in 1988 and initiated export-oriented economic reforms that encouraged external capital inflows, i.e. more foreign investment. He rejected import substitution and protectionism, as did

FIGURE 3

PRIMARY DUAL TIME LINE CONTINUUM (1986-1994)
(EPOCH TWO - BY DATE AND EVENT)

DATE & ECONOMIC EVENT

DATE & TRANSPORTATION EVENT

1986

1986
Mexico joins the GATT negotiations, which indicates a clear shift from protectionism to more liberal trade policies. Mexico finally opens its economy.

Mexico's inflation rate hits 180 percent.

Mexico begins to open its economy in earnest.

The Mexican economy begins to recover.
Mexico's non-petroleum exports (excluding maquiladora output) finally outpace its petroleum exports by value.

For the first time, Mexico relies on the exchange rate to bring the balance of payments back into equilibrium instead of relying on additional import restrictions. This signifies Mexico's change in focus from short-term to long-term objectives.

Mexico views its GATT membership as a way to promote private sector confidence in the government's commitment to liberalization.

When Mexico joins GATT, it agrees to replace official prices with tariffs by 1987 and then phase out tariffs later.

1986-1989
The average growth rate for maquiladora plants is 23 percent.

1986-1992
US exports to Mexico increase by 225 percent. US exports to the rest of the world rise by 97 percent during the same period. US imports from Mexico increase by 104 percent.

1986-1993
Mexico privatizes over 850 public enterprises out of 1,100 total.

1987 October
There is a world-wide stock exchange crisis.

1987

1987

1987
Mexico's inflation rate is 159.2 percent.

Mexico implements the Economic Solidarity Pact to minimize inflationary pressures with moderate price increases, controlling the rate of peso devaluation, and nominal wage rate readjustments.

1987-1988
Mexican tariffs are reduced.

1987-1989
Mexico accelerates trade liberalization to get its economy out of a fiscal deadlock.

1987-1994
The US-Mexico trade experiences 15 percent annual growth.

1988 July
Salinas de Gortari is elected as the next president of Mexico.

1988
Mexico's annual inflation rate is over 177 percent.

Mexico experiences a surge in consumer goods imports due to its new trade liberalization program and new worries about inflation appear.

Mexico tries to alleviate its unsustainable balance of payments situation by promoting external capital inflows.

Mexican President Salinas raises tariffs to cool the surge in consumer import goods.

Mexico's inflation rate drops dramatically.

The Mexican peso begins real appreciation.

Around 70 percent of Mexico's savings go to either servicing debt or subsidizing state-run enterprises.

President Salinas adopts an economic policy similar to those of the 1950s and 1960s. This policy, however, focuses on an export-oriented economy rather than import substitution and protectionism.

The private sector regains a strategic role in the Mexican economy and is challenged to rationalize its resources to more effectively compete in the global marketplace.

1988
Thirty-six Mexican airports can handle international flights.

Mexico's total domestic freight (516.71 million tons) is transported by the following modes: truck = 58 percent, water = 31 percent, rail = 11 percent, and air = <1 percent.

Mexican ports handle 217,000 TEUs.

1988

1988

1988-1993
Almost 83 percent of the growth in US exports to Mexico is not re-exported but goes toward Mexican consumption.

Late 1980s
The debt crisis begins to subside and Mexican sales improve.

1989
The Canada-US Free Trade Agreement goes into effect.

Mexico changes foreign investment regulations to permit first securities investment followed by direct foreign investment.

Mexico passes a law giving a more liberal interpretation to the 1973 foreign investment law.

1989-1990
The Mexican economy stabilizes further.

1989-1991
Mexican exports grow by 19 percent while Mexican imports grow by 50 percent.

1989-1993
Major amounts of foreign capital flow into Mexico but most of this is liquid and can be easily removed.

1990 January
President Salinas visits Europe to promote investment in Mexico but the region is preoccupied with eastern Europe.

1990 June
President Bush announces the Enterprise for the Americas Initiative to create a western hemisphere free trade region.

1990
An exchange of tax information agreement is signed between the US and Mexico.

Mexico and the US express interest in negotiating a free trade agreement due, in part, to the lack of overall progress in GATT negotiations.

Mexico's inflation rate is 30 percent.

Mexico re-negotiates its external debt with commercial banks.

1988-1994
Mexico constructs over 4,000 kilometers of private toll roads.

Early 1989
Mexico's rail volume begins to decline despite improvements in service and delivery times.

1989 March
Puertos Mexicanos is established in Mexico to bring order to the country's decaying 14 primary ports in an effort to promote international trade. Three new ports are being built while four major container ports are being upgraded.

1989
The Mexican trucking industry is deregulated.

Mexico begins opening up its transportation sector to limited private investment and management.

The interests of the shipper now take precedence over those of liner shipping due to intense competition for goods in the international marketplace.

President Salinas of Mexico initiates a $400 million port upgrade program.

1989-1992
Mexico and the US forge a bilateral agreement opening the Mexican air cargo and charter market to foreign competition.

US containerized exports to Latin America triple.

Air cargo imports to the US from Mexico grow by 53 percent to $806 million and airborne exports to Mexico grew by 92 percent to $2.1 billion.

1990 April
The first double-stack container train arrives at Mexico City's Pantaco intermodal yard.

1990
Intermodal traffic is rapidly increasing in both directions of the US-Mexico trade primarily because of new double-stack container services.

President Salinas fires 90 percent of Mexico's customs officials in one day and immediately installs 3,100 well-educated, secretly trained replacements in an effort to combat corruption.

1991

1991

1991 June
The US, Canada, and Mexico begin negotiating a North American free trade agreement.

1991 June
The Mexican government seizes the Port of Veracruz when it fails to submit a master plan for improving its productivity and efficiency. Union bosses are jailed, union contracts are canceled, and terminal operations concessions are opened to competition.

1991 July
The US International Trade Commission is requested to conduct a study on the effects of a free trade agreement with Canada and Mexico.

1991 July
Puertos Mexicanos has received 71 requests totaling $3 billion from interested private investors.

1991 August
Fruit carriers in the Latin America-US trade operate as common carriers to fill empty cargo space on return voyages. This depresses freight rates due to the oversupply of capacity.

Mexico passes a port law which requires all waterfront labor unions to disband and reorganize as new, private companies if they wish to provide stevedoring services.

1991 October
The European Community creates the European Economic Area, which includes 380 million consumers.

1991
38 US states rank Mexico as one of their top ten export markets.

The Mexican government still sets the parameters for economic activity.

Almost 50 percent of Mexico's imports consist of capital goods and imports are increasing at 20 percent annually.

PEMEX is still Mexico's primary source of revenue.

The economies of the industrialized nations begin to slow.

1991
Rail cargo in the US-Mexico trade is around 3.5 million tons northbound and 10.8 million tons southbound.

Mexico's port system handles 375,000 TEU containers. Puertos Mexicanos estimates this figure will be around 1 million TEUs by the year 2000.

Puertos Mexicanos releases a report stressing the crucial role of the nation's port system in President Salinas' plan to generate economic growth by promoting non-petroleum exports.

Puertos Mexicanos plans to spend $95 million this year on nine major port construction and maintenance projects. It also plans to spend another $42.5 million on port superstructure (i.e. equipment).

Puertos Mexicanos reports a nationwide growth of 6.1 percent in container traffic.

Canada's waterborne trade with Mexico is less than 1 million tons or .5 percent of the total trade.

1992 January
The Association of Southeast Asian Nations establishes a free trade area of 325 million consumers.

1992 February
Twelve technical papers are reviewed at a US International Trade Commission symposium and most of them agree that the US, Mexico, and Canada will benefit from a free trade agreement.

1992 March
Mexico initiates a $14 billion transportation upgrade program to improve its rail, highway, port, air, and communications systems.

1992

1992 August
NAFTA negotiations are completed.

1992 December
The US, Canada, and Mexico sign the North American Free Trade Agreement or NAFTA.

1992
The US exported more than $75 billion in goods to Latin America's 444 million consumers.

About 80 percent of Mexico's exports go to the US. Manufacturing earnings now outweigh petroleum earnings.

Approximately 2,000 maquiladora plants are in operation.

The average Mexican buys $450 worth of US-made goods.

Cumulative foreign investment in Mexico doubles from $20 billion in 1987 to $40 billion in 1992.

In a typical year around 70 percent of Mexico's merchandise imports come from the US.

A large portion of US-Mexico two-way trade is intra-firm.

Maquiladora output generally has 50 percent Mexican content and 50 percent US content.

Mexicans are clearly better off today than in 1988 due to trade liberalization.

Mexico is becoming more and more decentralized, less corporatist, and economic reform is succeeding. It has shifted from a state-dominated structure to a market-oriented one.

1992 September
Mexico transfers control of port privatization from the Ministry of Communications and Transport to the Ministry of Finance to speed up the process.

1992 December
Mexico announces plans to privatize major sectors of its national infrastructure including the port system.

1992
US Customs allocates over $300 million to upgrade border inspection stations and hire 386 new inspectors in the Southwest.

For the first time, more US intermodal containers move by rail than by truck.

The US enacts the Intermodal Surface Transportation Efficiency Act (ISTEA) to further integrate the country's transportation system.

Mexico allows US railroads to pre-clear commodities in a program called 'despachio previo' so that the paperwork is taken care of by the time the train arrives at the border.

In the US-Canada trade, 85 percent of the cargo moves by land.

Mexico extends port service to 24 hours a day, 365 days a year and simplifies its port charge tariff system.

Mexico and nine other Latin American countries implement a port state control program to ensure that 15 percent of ships entering their ports comply with IMO safety and pollution regulations by 1994.

Mexico has four major container ports open for service.

Average container throughput at specialized Mexican ports is up to 32 moves per ship per hour compared with 12 per hour in 1988. The goal is to reach 50 moves per hour.

Mexico spends $126 million on port infrastructure upgrades.

Discussions are taking place on extending the US Gulf Intracoastal Waterway into Mexico. This plan, however, would take years to complete. Other options, such as short-sea routes, are also being considered.

1992

1992
Mexican seaports handle nearly 450,000 TEUs.

US ports handle an estimated 20 percent of Mexico's containerized trans-Pacific cargo.

The ports of Veracruz, Altamira, Lazaro Cardenas, and Manzanillo handle about 73 percent of all container moves through the 15 Mexican ports capable of handling such shipments.

Water transportation handles about 6 percent of US-Canada commerce.

Only 8.5 percent of US-Mexico trade cargo moves by water transport.

1993 March
President Clinton begins negotiations with Mexico and Canada on side-agreements to NAFTA, such as labor and the environment, as a pre-condition to seeking congressional approval.

1993 March
US transport officials express concern about poor security in Mexico following a number of truck hijackings involving APL containers loaded with high-value cargo.

1993 July
President Salinas reveals a new 'Law of Ports' which sets up semi-autonomous integral port administrations or APIS to oversee administrative and operational activities at Mexican ports such as granting port services concessions to private interests.

1993 August
Mexico announces 27 private port concessions at 15 predominantly liquid and dry bulk terminals and also at a few general cargo terminals.

1993 October
Foreign interests may own up to 49 percent of semi-autonomous integral port administrations or APIS and 100 percent of port service companies.

Mexico creates its first semi-autonomous integral port administration or APIS, which is similar to a US autonomous port district, at the fishing port of Puerto Madero.

1993 November
The US Customs Modernization Act is passed in Congress. Customs can now implement its electronic import processing system called the National Entry Processing System.

1993

1993 December
Mexico begins issuing NAFTA implementation regulations in the Diario Oficial, which is similar to the US Federal Register.

1993 December
Mexico becomes one of the eighteen board members of the International Standards Organization. This should help Mexico end the use of local standards to protect domestic industry.

In the US-Mexico trade, 5 truckloads of cargo move north for every 10 that move south creating a large trade imbalance.

1993
Mexico's austerity program is yielding results such as a reduced trade deficit, expanding industrial production, higher Mexican oil prices, lower interest rates, and a 16 percent inflation rate.

Mexico is the United States' fastest growing export market at an average rate of 22 percent annually since 1988.

Texas controls over 50 percent of US-Mexican trade.

Maquiladora plants now account for 14 percent ($3.6 billion) of Mexico's exports to the US.

The average Mexican tariff is 10 percent.

The average US tariff is 4 percent.

Mexico experiences record foreign investment but experts warn it must do more to attract capital not at risk for quick withdrawal.

Total trade between Canada and Mexico is $3.5 billion and rising.

US-Mexico trade is worth over $70 billion.

1993
Road transport accounts for 80 percent of Mexico's domestic freight traffic.
Mexican infrastructure upgrade funding ($13.5 billion) is broken down as follows: highways = 56 percent, communications = 22 percent, railroads = 14 percent, seaports = 3 percent, and airports = 3 percent.

Mexico plans to spend $1.48 billion on highway infrastructure upgrade programs.

Transportation issues regarding the NAFTA countries are being addressed by the Transportation Working Group.

Container hijackings and armed robberies in Mexico double from 1992 figures.

Bridges handle over 70 percent of all US-Mexico commerce.

Intermodal terminals are being constructed at Monterrey and Guadalajara to complement the one already in Mexico City.

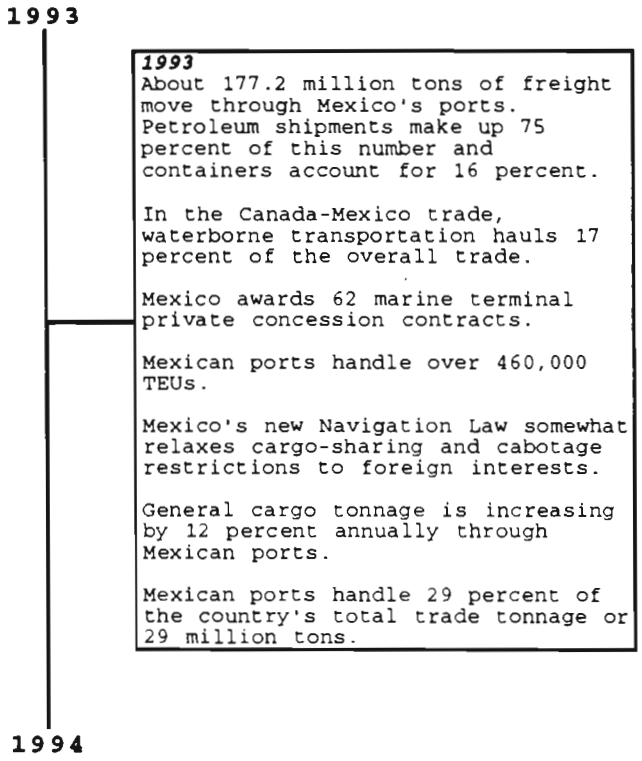
Over 1.7 million freight movements occur at the US-Mexico border.

Mexico invests $110 million to upgrade port infrastructure.

Latin America's container trade drastically improves due to lower trade barriers, product diversification, economic restructuring, and new services by liners such as Maersk and Sea-Land.

Mexico's port infrastructure upgrade program is nearly complete and the focus is shifted to improving the administrative, regulatory, and operational aspects of the port system.

A World-Wide Shipping survey indicates that shippers have a poor opinion of marine transportation compared to air, rail, and trucking.



Sources: See Appendix B, p. 335 for a list of general literature reviewed.

President de la Madrid in the preceding administration. Nevertheless, President Salinas temporarily raised tariffs in 1988 to dampen the import surge. He did so only to check inflation. US exports to Mexico took on new significance between 1988 and 1993. Over 83 percent of the growth in this sector consisted of goods consumed in Mexico rather than maquiladora commerce. This meant that more cargo was becoming available for capture by ocean transportation. Major changes began to take place in the Mexican transport system after President Salinas took office. He realized that Mexico needed an efficient transportation system if the country was to become an effective competitor in global commerce. Many new toll roads, for example, were constructed between 1988 and 1994 to accommodate intermodal traffic.

Puertos Mexicanos was formed in 1989, under the Mexican Ministry of Communications and Transport, to overhaul the decaying port system with a $400 million program. Mexico's trucking industry was deregulated that year, as well. Also, US-Mexico air cargo shipments grew dramatically between 1989 and 1992. Mexico made delivery time and service improvements in its state-owned railroad, but rail volumes continued to drop in bulk commodities. Regardless, the country entered a period of economic stability in 1989 with increasing imports, exports, and foreign investment. The US and Canada also signed a free trade agreement that year, which facilitated the subsequent negotiation of NAFTA. US exports to Latin

America began to pick up in earnest and all modes experienced greater traffic in manufactured goods. US containerized cargo flows to the region tripled between 1989 and 1992.

In 1990, the US, Mexico, and Canada expressed interest in negotiating a trilateral free trade agreement, largely out of frustration with the ongoing GATT negotiations and the anticipated formation of other large trading blocs. This sparked increased interest in Mexico by many foreign industrial concerns. Mexico stabilized even further after renegotiating its huge foreign debt; its inflation rate dropped to 30 percent. New technologies, such as intermodalism, were being introduced to Mexico at that time and subsequently led to huge increases in import/export volumes. President Salinas also tried to clean up Mexican Customs by firing 90 percent of the officers and installing 3,100 secretly-trained replacements in one day. He also had the Mexican army seize the Port of Veracruz, which previously held one of the highest robbery rates in the world. He did so to break the grip of powerful unions and improve the port's productivity. Union bosses were jailed, stevedore contracts were cancelled, and the port was opened to private competition. Mexico also passed new legislation to force stevedore operations to reorganize as private companies if they wished to compete for contracts. This was solid proof that President Salinas was serious about upgrading and privatizing the Mexican port system. Mexico reported a

nationwide container flow growth rate of 6.1 percent during 1991 and its ports actually handled 375,000 TEUs of cargo that year.

The European Community created its European Economic Area in 1991. This trade bloc consisted of 380 million consumers and provided an even greater impetus for the US, Mexico, and Canada (together comprising 360 million consumers) to negotiate a trade agreement that would allow them to compete more effectively in global commerce. The economies of developed countries were slowing down at that time, which was partially responsible for the great attention given to the rapidly expanding US-Mexico trade.

In 1992, yet another trade bloc was formed. It was the Association of Southeast Asian Nations and consisted of 325 million consumers. This made the successful negotiation of a North American Free Trade Agreement even more important. The US International Trade Commission reviewed twelve economic studies that year, which largely concluded that all three countries involved in NAFTA negotiations would benefit from the agreement. Mexico subsequently embarked on a $14 billion plan to upgrade its national transportation infrastructure to handle the anticipated growth from NAFTA. This was the largest such project to date. It also transferred Puertos Mexicanos to the Ministry of Finance to accelerate the port infrastructure upgrade and privatization program. Mexico's economic reform was clearly succeeding by 1992. Mexicans

were better off that year than in 1988 because of trade liberalization. The country changed from having a predominantly state-controlled economy to more of a market-oriented one. Foreign investment in Mexico doubled to $40 billion between 1987 and 1992. Manufactured goods accounted for most of the total US-Mexico trade by value, which was promising for ocean transportation. In 1992, the US, Mexico, and Canada signed the North American Free Trade Agreement, which phases out all trade barriers and tariffs by 2008. President Clinton also successfully negotiated the environmental and labor side agreements to NAFTA that year.

Mexico had four major container ports open for 24-hour service in 1992. They were Veracruz, Altamira/Tampico, Manzanillo, and Lázaro Cárdenas. These ports also handled 73 percent of all container moves in the country's port system. They improved container throughput to an average of 32 transfers per ship per hour, compared to 12 moves per ship per hour in 1988. The goal of these ports was to reach 50 moves per hour. Mexican ports handled 450,000 TEUs in 1992, which indicated that President Salinas' port upgrade program was clearly having an impact on productivity. Discussions also began on extending the US Intracoastal Waterway into Mexico and additional short-sea routes were being studied. Despite all of this activity, ocean transportation handled only 8.5 percent of all US-Mexico commerce in 1992. Trucking continued to dominate the market. Motor carriers, however,

have subsequently been under increasing attack by hijackers on Mexican highways.

In 1993, President Salinas passed legislation to turn over all Mexican ports to new, semi-autonomous port administrations. They would control port planning, port administration, and the granting of private concessions. This was done to decentralize the system. Over 25 private concessions had been granted by August 1993 and the first semi-autonomous port administration had been installed at the fishing port of Puerto Madero by October. These administrations are open to 49 percent foreign investment under Mexican law and the private concessions are open to 100 percent foreign investment.

Mexico was the United States' fastest growing export market in 1993. Much of this growth, however, was due to pre-NAFTA anticipation. Foreign investment in Mexico grew rapidly in 1993, but much of it consisted of liquid assets that could be quickly removed. Mexico's ongoing austerity program had the intended effect of reducing inflation, interest rates, and the trade deficit. The average Mexican tariff actually fell to ten percent in 1993, while the average US tariff was four percent. Many Mexican tariffs were 100 percent in past years. Total US-Mexico trade was worth over $80 billion in 1993.

Infrastructure upgrades were well underway in all sectors of the Mexican transportation system to handle the

anticipated NAFTA-generated growth. Highways received nearly 56 percent of the approximately $14 billion infrastructure improvement program. Communications had a 22 percent share, railroads received 14 percent of the funds, seaports had a 3 percent share, and airports also received a 3 percent allocation. Waterborne commerce and double-stack train services gained added attention in 1993 after container hijackings doubled on Mexican highways from 1992 figures. This was probably due to increasing cargo flows and insider information about container contents. Regardless, Latin American container volumes increased dramatically as regional trade barriers fell and transportation infrastructure was upgraded.

Mexico's port infrastructure program was nearly complete by the end of 1993. Mexican ports handled over 460,000 TEUs that year and general cargo tonnage through them was increasing at an average annual rate of 12 percent. These ports handled 29 percent of Mexico's total trade in 1993. Once the Mexican port upgrade program was largely completed, the focus shifted to converting the ports into semi-autonomous administrations. The state, however, would retain ownership of all existing infrastructure and waterfront property, as required by the constitution.

Several large ocean carriers began liner service to Mexico during 1993 to take advantage of higher productivity at the country's ports. They did so to position themselves

for the anticipated post-NAFTA boom in US-Mexico traffic. Despite a positive outlook for ocean transportation in the trade, studies indicated that shippers still had a low opinion of ocean transportation, compared to trucking, rail, and air. This was and continues to be one of the biggest problems facing ocean-liner operators in the US-Mexico trade.

Epoch Three (1994-2008)

Epoch Three was analyzed next and comprised the years 1994 to 2008 on a variable time scale. See Figure 4. On January 1, 1994, the North American Free Trade Agreement went into effect and immediately removed tariffs on almost 50 percent of NAFTA-qualifying commodities. The agreement created a trade bloc consisting of 360 million consumers with a combined gross domestic product of almost $6 trillion. Mexico also passed its Law On Economic Competitiveness, which opened the country to additional foreign investment. In 1994, foreign investors actually controlled one-fourth of Mexico's largest corporations. Mexican implementation regulations, however, tended to bog down any major changes in the country's foreign trade and investment policies. This was probably the result of Mexico trying to bring its regulations up to international standards as quickly as possible. Mexican governmental resources currently seem to be straining under the demands of NAFTA and the current peso crisis.

FIGURE 4

PRIMARY DUAL TIME LINE CONTINUUM (1994-2008)
(EPOCH THREE - BY DATE AND EVENT)

DATE & ECONOMIC EVENT		DATE & TRANSPORTATION EVENT
	1994	
1994 January NAFTA is implemented creating a free trade area of 360 million consumers with a combined gross domestic product of almost $6 trillion. Mexico is now one of the world leaders in low-cost manufacturing. Mexico's Law On Economic Competitiveness, which opens up many areas of the economy up to 100 percent foreign investment, is enacted. About one-half of all US goods can enter Mexico duty free provided they meet NAFTA's 'Rules of Origin' requirements. The Tri-Lateral Trade Commission is established to resolve trade disputes between the NAFTA members.		***1994 January*** Mexico announces a new $16.7 billion plan to upgrade the nation's transport and communications sectors. Around $11.5 billion will be financed through private sector projects. The Border Infrastructure and Facilitation Task Force holds its first meeting. Its purpose is to identify ways to make cross-border transportation more efficient and to plan future border infrastructure development. US-Mexico border traffic is snarled due to the cumulative effects of seemingly insignificant transport and customs problems not dealt with in NAFTA negotiations. Mexico plans to spend $10.7 billion on highway infrastructure upgrade programs. Mexico plans to spend $1.6 billion on railroad infrastructure upgrade programs. Mexico plans to spend $467 million on aviation infrastructure upgrade programs. Mexico plans to spend $3.1 billion on communications upgrade programs. Mexico plans to spend $600 million on port infrastructure upgrade programs.
		1994 February Mexico plans to privatize the nation's airports (only services - not administration). Airport officials are very interested in developing intermodal shipments. Mexico now allows trailers on flat cars or piggybacks to enter the country in-bond and be cleared at the final destination. Mexico announces two new Administraciones Portuarias Integrales or APIS at the ports of Veracruz and Manzanillo.
	1994	

1994

1994 March
US trade representatives meet with Mexican officials to discuss accelerating tariff reductions on many commodities such as wine, appliances, and glass.

PRI (the ruling party in Mexico) presidential candidate Colosio is assassinated.

1994 March
The largest US customs broker association urges US Customs to hire more inspectors and trade specialists to handle increasing traffic at the US-Mexico border.

Mexico considers a new law to streamline cargo inspections at the nation's ports to prevent delays from too many permit and approval requirements.

Because over 80 percent of Canada's trade with Mexico now moves over land, the impact of NAFTA on Canada-Mexico marine transportation will be minimal.

Mexico announces it will phase out auto incentives for shippers using Mexican ocean carriers and will bring its fleet up to standards in order to join the Organization of Economic Cooperation and Development (OECD).

1994 April
US, Mexico, and Canada sign a maritime agreement primarily designed as a framework for sharing information.

1994 July
Mexico begins electronic data transmission of customs information to Mexican customs brokers.

1994 August
Ernesto Zedillo of the ruling PRI party wins Mexico's presidential election.

1994 September
NAFTA has already increased US-Mexico trade by 20 percent.

1994 September
Mexico completes its two-year process of decentralizing the state-controlled ports into semi-autonomous integral port administrations or APIS.

1994

1994 October
Mexico considers expropriating land along the US border to build new roads in an effort to alleviate congestion.

A researcher at Louisiana State University says that small, roll-on/roll-off vessels called 'coasters' could effectively move containers and trailers between the US East and Gulf Coasts, Canada, and Mexico.

Delays in Mexican rules for port privatization frustrate potential investors and cause facility neglect at the ports as interested parties take a wait-and-see approach.

Carriers interested in the US-Mexico trade complain that new APIS administrators are the same people from the old federal port agency, Puertos Mexicanos, and have a hard time grasping the concept of competition.

Carriers are interested in operating highly profitable Mexican container terminals but APIS administrators are not obligated to grant these concessions. They may retain control even though the carrier could do a better job.

The prize Mexican container ports of Veracruz, Altamira/Tampico, Manzanillo, and Lazaro Cardenas have yet to be offered up for private operation.

1994 November
Mexico's President Salinas leaves office.

Inflation in Mexico is 7.5 percent compared to 180 percent in 1988.

1994 December
President Zedillo takes office in Mexico replacing President Salinas.

Foreign investment in Mexico reaches $52 billion.

Mexico is printing too much money to artificially prop up the peso in the international market. US Treasury and IMF economists advise President Zedillo to abandon protecting the peso. He announces that the peso will no longer be pegged to the dollar.

The Mexican peso drops in value by 15 percent under financial pressures and the Mexican stock market immediately loses 3 percent of its value. This begins Mexico's second major currency crisis.

Mexico decides to let its peso float, which subsequently drops in value by 39 percent. Capital flight ensues due to the highly liquid nature of foreign investments in Mexico. President Zedillo fires his finance minister.

1994 December
Latin America is still unable to independently finance its crucial transportation infrastructure and thus remains dependent on foreign investments.

Shippers and carriers once again complain about armed cargo theft in Mexico and Guatemala. Joint lobbying efforts may be the only way to bring about change.

1994

NAFTA phases out tariffs which are now permitted to be significantly increased under GATT.

US exports to Mexico average $1 billion per week between May and December.

Foreign investors control one-fourth of Mexico's largest corporate enterprises.

Economic growth forecasts for Mexico are bleak.

Mexico's reputation to foreign investors is hurt by the peasant uprising in Chiapas and the assassination of two prominent political figures.

Shippers in the US-Mexico trade focus more on NAFTA than GATT.

Since NAFTA went into effect on January 1st, trade between Mexico and the US has risen to record levels. Mexican exports grew faster than US exports cutting the US trade surplus by 45.1 percent.

Mexico is trying to bring its regulations up to international standards as quickly as possible sometimes to the dismay of those involved in US-Mexico trade.

Importers and exporters in the US-Mexico trade complain of excessive regulations and abrupt rule changes by the Mexican government since NAFTA took effect.

Mexico's population is 87 million.

Productivity at maquiladora plants is up by an estimated 5.2 percent.

Around one-third of Mexicans live in urban areas. Of these, 39 percent can afford consumer-ready products while another 22 percent have the desire to buy imported consumer products.

The Maritime Administration says that inter-America trade is the fastest growing sector of US commerce.

1994

The $375 million US Capital Improvement Program, designed to upgrade US-Mexico border infrastructure, nears completion.

US trucking firms are having a hard time finding backhaul cargo from Mexico because of difficulties in re-positioning equipment.

US railroads are having a difficult time finding backhaul cargo from Mexico because the north-south rail lines are not as developed as east-west lines. It is hard to re-position equipment for backhauls.

Cargo shipments into Mexico are still limited but container traffic is increasing.

Downsizing and occasional rail equipment shortages keep some intermodal joint-ventures from being implemented in the US-Mexico trade.

Intermodalism is the fastest growing sector of rail transportation.

Shippers today demand consistent, zero-defect deliveries from transport companies.

Mexico's shipping companies are popular targets for foreign joint-ventures.

Rail is increasing its market share in the US-Mexico trade.

President Salinas states that FNM, Mexico's state-owned railway, is a disaster and there is no justification for keeping it under state control regardless of constitutional restrictions to the contrary.

Air cargo transport to Mexico is still hampered by a requirement that consolidated shipments be cleared through customs at the first point of entry before disbursement instead of permitting in-bond shipments.

Mexican cabotage laws still prohibit non-Mexican rail and truck lines from operating in Mexico.

One gallon of diesel fuel can move one ton of cargo 59 miles by truck, 202 miles by rail, and 514 miles by barge.

Mexico has 29,000 miles of federal highways. Only 15 percent are in excellent condition, 57 percent are in average condition, and 28 percent are in poor condition.

1994

1994
US-Mexico trade reaches a record $92 billion.

1994
The Mexican government is planning to construct a 7,240 mile network of superhighways to link up the countries major ports with primary industrial and commercial centers. Over 1,000 miles of this network are now complete.

Mexico spends $30 million to liquidate union contracts at ten of the country's ports up for privatization in order to improve throughput efficiency.

Mexico has 18 deep-water commercial ports.

The Mexican ports of Veracruz, Manzanillo, Lazaro Cardenas, Progreso, Puerto Madero, Tampico, Acapulco, Altamira, Guaymas, and Chetumal are taken over by semi-autonomous integral port administrations (APIS).

Steamship lines now emphasize shipping cargo to Mexico by all-water routes instead of using their intermodal connections. This signifies a major change in the way carriers view the Mexican port system which is now effectively functional.

The Mexican government will continue to own existing port infrastructure, water areas, and waterfront property but their use, development, and exploitation will be open to private concessions.

US-Mexico waterborne shuttle services experience difficulties competing with trucking and rail due to the latters' quicker delivery times to Mexico City, Guadalajara, and Monterrey. Finding northbound cargo is also a big problem.

Mexican port privatization (i.e. awarding of port concessions) gets bogged down when the semi-autonomous integral port administrations (APIS) cannot decide who should get the concessions.

Asia is the largest exporter to Mexico by ocean transport.

Mexico liquidates its centralized port authority, Puertos Mexicanos, and turns over administration of the country's ports to semi-autonomous port authorities or APIS administrations.

1995

1995 January
The US buys up pesos in an effort to stop the currency's slide. The crisis worsens. President Clinton extends Mexico a $9 billion line of credit.

The US $9 billion line of credit is insufficient, so the US begins negotiating a $40 billion credit package with Mexico in an effort to save its economy. The US Congress, however, is expressing early disapproval of the measure.

The Mexican economy is headed for a recession.

Many US retailers say they will continue to move ahead with plans to increase their presence in Mexico despite the peso crisis.

1995 January
US Customs begins the most sweeping change in its history to implement the 1993 Customs Modernization And Informed Compliance Act to handle increasing US commerce.

It is projected that Mexico will spend from $20 billion to $50 billion by the year 2010 on new roads, bridges, border crossings, ports, and other infrastructure projects.

Mexico finally amends Article 28 of its constitution to remove the state-owned railway, FNM, from the strategic national asset list. This will effectively permit private investment in the railroad although the level of privatization is still pending.

US railroads such as UP and SP are interested in Mexico's north-south rail lines while some steamship lines may be interested in east-west rail links from the Ports of Manzanillo or Veracruz to Mexico City.

The global airline industry begins coming out of a four-year slump.

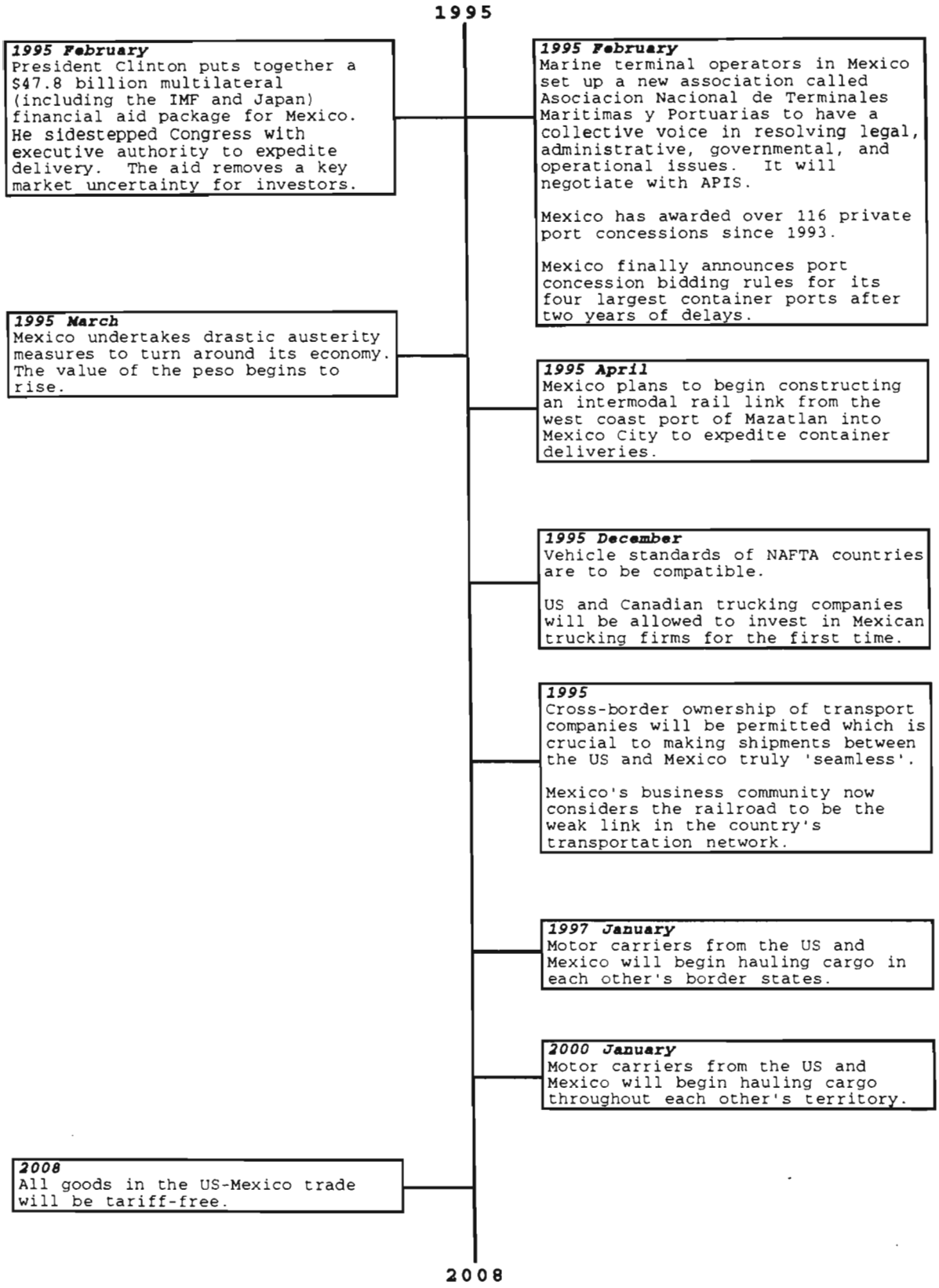
The Mexican government approves a constitutional amendment to take FNM off the country's list of strategic industries. This will finally permit foreign investment in the inefficient railroad. US railroads and ocean-liners are interested in concessions.

Shippers cancel orders due to the peso devaluation and cargo delays occur at Mexican ports as many consignees hold off accepting goods already shipped. This is tying up containers needed for outbound shipments.

Mexican shipping agents worry that steamship lines will eventually cut back service to Mexico due to the Mexican currency crisis and reduced demand by Mexican consumers.

Mexico announces an accelerated program for privatizing port concessions at the country's four major container ports to raise $200 million urgently needed capital. Bidding rules for these concessions are due out in February 1995.

It is still unclear whether carriers calling at Mexican ports will be permitted to bid on terminal concessions.



Sources: See Appendix B, p. 335 for a list of general literature reviewed.

Mexico's economic future looked very bright at the beginning of 1994. It became one of the world leaders in low-cost manufacturing, much of which comprised maquiladora output. US trade representatives began meeting with Mexican officials to discuss accelerating tariff reductions on many commodities. Mexico's inflation rate was down to 7.5 percent, compared to 180 percent in 1988. Trade between the two countries began to expand even faster once NAFTA went into effect. In fact, US-Mexico commerce had already increased by 20 percent by September 1994. The Port of Veracruz alone handled over 230,000 TEUs between January and November 1994. According to the Maritime Administration, inter-America trade is presently the fastest growing sector of US commerce. This signifies a major change from the past dominance of east-west trades. Thus, Latin America has tremendous potential, particularly for waterborne commerce.

Several major events occurred in late 1993 and 1994 that would drastically affect Mexico's standing in the world economy by 1995. An assassin killed the leading Partido Revolucionario Institucional (PRI) presidential candidate, Luis Donaldo Colosio, during a political rally in Tijuana. Foreign investors became uneasy because they considered Colosio to be the best advocate for continued trade liberalization once President Salinas' term ended in 1994. They were also shaken by two peasant uprisings in the southern State of Chiapas, which suggested the Mexican

government was not as in control of its internal affairs as everyone had thought. The PRI secretary-general, Jose Francisco Ruiz Massieu, was also assassinated that year. To make matters worse, much of the foreign investment in Mexico was liquid and could be quickly withdrawn at the first sign of trouble.

Increasing US-Mexico trade, which grew even faster after NAFTA went into effect, was causing huge delays at the Mexican border. Confusion over NAFTA implementation rules by US and Mexican Customs officials, carriers, and shippers were also partially responsible. President Salinas initiated another $16.7 billion plan to continue upgrading the country's communications and transport infrastructure to handle increasing traffic. As expected, highways and railroads received most of this money in an effort to relieve severe border congestion, which became even worse after NAFTA went into effect. There was also a new emphasis on upgrading the Mexican intermodal system, including air cargo terminals, to improve efficiency in the country's foreign trade. Many joint-ventures were negotiated among carriers of all modes during 1994. Railroad equipment shortages, however, prevented some of them from materializing. It was also very difficult to reposition equipment to carry backhaul cargo due to trade imbalances and transport system inefficiencies.

The Mexican government knew that intermodal transportation was crucial to the country's ability to

effectively compete in global commerce. It built and/or upgraded three major intermodal truck/rail terminals, located in the large industrial regions of Mexico City, Guadalajara, and Monterrey, to facilitate increasing cargo flows. About one-third of all Mexicans live in these urban areas. Trailer-on-flat-car service drastically improved when Mexican Customs finally allowed such trains to move in-bond into the country. This was a major breakthrough for railroads because it allowed them to bypass most of the border congestion. Now they could market their services to trucking firms as a way to expedite customs clearance and provide additional security for shipments.

Container hijackings continued to rise on Mexican highways during 1994 as trade increased. In fact, several major carriers, such as American President Lines (APL), began promoting all-water service over longer, land-based intermodal hauls due to the hijackings. Drastically improved efficiency and productivity at Mexican container ports made the changeover possible. This was a complete turnaround in APL's preferred method of transporting Mexican cargo.

Much effort was also put into streamlining US-Mexico cargo flows at the border. This included infrastructure upgrades and electronic customs filing in both countries. The US government spent $375 million to upgrade US-Mexico border crossings, which directly benefits trucking and rail. Inside Mexico, however, the new private toll roads are still

largely avoided by truckers because the tolls are too high. Concession contracts were not long enough for builders to recoup expenses at lower rates. Thus, truckers continue to use secondary roads, which increases transit times and exposes them to hijackers. Also, air cargo shipments are still prevented from moving in-bond into Mexico, which greatly hinders efficiency and just-in-time deliveries. These situations are already benefitting ocean transportation with non-intermodal shipments, as evidenced by the new APL operations described above.

In 1994, Mexico took steps to improve its standing as a maritime nation by phasing out shipper incentives and upgrading its merchant fleet. It did so to gain acceptance into the Organization of Economic Cooperation and Development (OECD). Moreover, the US, Mexico, and Canada signed an agreement to permit the sharing of maritime industry information that year. Because over 80 percent of the Canada-Mexico trade also moves by land, NAFTA is affecting the trade's waterborne commerce to a much smaller degree than its trucking and rail sectors. In 1994, Mexico's port system received another $600 million, out of a new $16.7 billion transportation upgrade plan approved that year, for additional improvements. Port privatization was well underway that year when semi-autonomous port administrations were installed at several large container ports. Mexico completed the transfer of all its ports to semi-autonomous

port administrations by September 1994 and the government subsequently liquidated Puertos Mexicanos. This huge, centralized agency was created by President Salinas in 1989 specifically to upgrade and privatize the Mexican port system. Mexico also spent $30 million to liquidate union contracts at the country's top-ten ports to improve cargo throughput and overall productivity.

Many ocean carriers expressed interest in bidding on private operations and service concessions at the primary Mexican container ports, which included Veracruz, Altamira, Manzanillo, and Lázaro Cárdenas. The release of specific bidding rules became bogged down, however, when the new Mexican port administrations could not decide on who should get the concessions. Carriers and stevedores also complained that the new semi-autonomous port administrations were being run by the same people who used to work for Puertos Mexicanos. They claimed these administrators did not understand free-market competition and were reluctant to turn over port operations to private carriers and stevedores, even though they could do a better job. This confusion and frustration led to some neglect at the recently improved container ports. Interested investors adopted a wait-and-see policy before committing additional resources. Nevertheless, most Latin American countries, including Mexico, were unable to finance their own transportation infrastructures in 1994. They remained dependent on foreign capital for improvements.

The year 1994 was shaping up to be the best year ever for US-Mexico commerce. Mexican President Salinas had just left office after what appeared to be a very successful term and was replaced by Ernesto Zedillo, who vowed to continue with trade liberalization. Total US-Mexico trade reached $92 billion by the end of the year. Mexico was printing too much money, however, in an effort to create the illusion of a secure foreign investment market. President Salinas was later blamed for this since President Zedillo only assumed the office in December 1994. Growing financial pressures from the international financial market exposed Mexico's fiscal weakness and the peso lost 15 percent of its value. President Zedillo decided to let the peso float freely from the US Dollar to bring about the overdue value adjustment. Nobody realized, however, that the peso would take an immediate 39 percent dive in value. This devaluation sent Mexico's economy into chaos and massive capital flight ensued. Again, this occurred because most of the foreign investments were in liquid assets and thus easy to remove.

Several academic journal articles from the early-1990s predicted this crisis with great accuracy. Mexicans lost about 40 percent of their purchasing power, which is currently harming US exports to Mexico. The latter will now be forced to place more emphasis on attracting long-term foreign capital investments in factories, port infrastructure, air terminals, etc. Investors, such as APL

and Sea-Land, are far less likely to abandon a multi-million dollar outlay for port infrastructure because of short-term market fluctuations. These investments in non-liquid assets will make Mexico much stronger in the long-run.

In January 1995, the Mexican financial outlook was bleak. Its economy was in crisis and possibly headed for a recession. President Clinton arranged a $40 billion bailout package, but the US Congress failed to act on it. Many retailers and transportation carriers, however, said they would press ahead with their expansion plans in Mexico. They considered the current economic turmoil to be temporary in nature and wanted to better position themselves for post-crisis trade. The general consensus appeared to be that the peso crisis was going to be a painful disruption to US-Mexico commerce that would probably last no more than a year or so. Most sectors of the transportation industry were negatively affected by this crisis. Massive backups occurred at the border and in Mexican ports. This was caused by deliveries that were cancelled or put on hold by Mexican consignees. The peso crisis devastated certain commodities in the trade, such as auto parts. This seriously affected trucking and rail operators, which handle the bulk of such commodities. Most ocean carriers also had to re-evaluate their liner services to Mexico.

The peso devaluation may actually benefit the Mexican transport network in the long-run, particularly since NAFTA

is available to facilitate a recovery. The following examples illustrate this point. North-south cargo imbalances are expected to undergo major adjustments as exports from Mexico increase. Before the crisis, there were huge equipment imbalances for major carriers in all modes. Trade patterns may eventually stabilize with more balanced cargo flows and more efficient equipment utilization. Moreover, the Mexican government was forced to set aside nationalistic rationale and open Ferrocarriles Nacionales de Mexico (FNM) to privatization. It did so as part of an emergency $14 billion privatization plan to raise urgently needed capital. Such a move has been opposed for decades and would probably never have occurred without the present financial crisis. Nationalism is the major reason that FNM is in such poor condition today. It excluded the introduction of foreign investment and new ideas.

The emergency plan required and received a constitutional amendment to Article 28 to remove the railroad from Mexico's list of strategic national industries. President Zedillo is still trying to determine which segments of FNM should be privatized and will open foreign bidding on concessions later in 1995. FNM is presently considered to be the weak link in Mexico's transportation network; a distinction held by the Mexican port system until only recently. Regardless, the entire Mexican rail system will drastically improve as US and Canadian railroads bid on

operations concessions. They will bring advanced technology and expert management to Mexico, which will also benefit the entire US-Mexico intermodal transport network.

In regard to maritime transportation, the peso crisis forced Mexico's government to accelerate the release of bidding rules on concessions at the primary container ports after two years of delays. Carriers and stevedores, however, can win concessions only at one marine terminal per coast to prevent a recurrence of past monopolies. The government finally released the rules in February 1995 in an effort to raise $200 million in urgently needed capital. Many carriers, stevedoring firms, and port service companies are still interested in these concessions despite the delays. A new terminal operators association was also established in February 1995 to give concession winners a collective voice in dealing with the Mexican government and the new semi-autonomous port administrations. Mexico has awarded over 116 private port concessions since 1993. Regardless, it still has many more to release.

The sooner Mexico works out the details of private transport concessions in all sectors, the sooner its overall transportation system will improve from new investments. Air cargo terminals and power plants are also being opened to private investment under the emergency privatization plan. Despite the current financial crisis, Mexico still plans to spend anywhere from $20 billion to $50 billion by 2010 on

infrastructure upgrades. They include projects like tunnel expansions to permit double-stack train service from Mexican container ports to interior industrial regions. Mexico will also begin working on an intermodal rail link from the Port of Manzanillo to Mexico City in April 1995. Several of the larger ocean carriers, such as APL and Sea-Land, have expressed an interest in intermodal rail concessions now that large segments of FNM are due to be privatized. The Port of Veracruz-Mexico City rail corridor is another route under consideration by APL and Sea-Land. It is possible that many of these planned improvements would have taken much longer to complete, or perhaps would not have been considered in the first place, without the sense of urgency brought on by the peso crisis. Thus, Mexico's transportation system may emerge from the turmoil in an even better condition. Nevertheless, shipping agents still fear the crisis will cause some ocean carriers to terminate operations in the US-Mexico trade, at least in the short-term.

President Clinton put together another $50 billion multilateral bailout package in February 1995 that included loans from Japan and the International Monetary Fund. He used his executive authority to bypass the US Congress, which would have probably defeated the measure. The loan guarantees were tied to PEMEX oil revenues for security, which again raised nationalistic opposition in Mexico. Regardless, the plan is now in effect and Mexico has access

to considerable monetary reserves. The Clinton package helped remove a key uncertainty for investors, but did not end the crisis. Anyone involved in the US-Mexico trade, however, knew the Mexican economy was due for a major adjustment and many chose to ignore the signs. The literature review revealed several explicit warnings that a crisis was impending.

Mexico initiated extensive austerity measures in March 1995 to get its economy back on track. They will be very hard on the Mexican population. This emergency program is generally expected to take about a year or so to turn the economy around, even though the impact of the crisis may persist for years. Long-term, incremental benefits of NAFTA and President Clinton's financial aid package should also help expedite Mexico's efforts to revitalize its economy. This will ultimately lead to increased trade and new cargo flows for ocean transportation.

By the end of 1995, vehicle standards are scheduled to be compatible under NAFTA, which will help streamline intermodal operations and equipment usage. US and Canadian trucking interests will also be allowed to invest in, and completely own, Mexican trucking firms by the end of 1995. Nevertheless, many foreign operators will continue to seek joint-ventures with Mexican companies. This has been the dominant trend in all modes over the past few years due to carrier unfamiliarity with the Mexican culture, customs,

regulations, and domestic market. By 1997, motor carriers from Canada, Mexico, and the US will be allowed to haul cargo in each other's border states. This will be expanded to include North America-wide coverage by the year 2000, which will permit truly seamless service. And finally, all tariffs on every NAFTA-qualifying commodity will be eliminated by the year 2008. Even though most of the NAFTA transport provisions apply to trucking, ocean transportation will still benefit from long-term growth generated by the North American Free Trade Agreement. It is also unlikely to be overly affected by the peso crisis, at least in the long-term, since waterborne commerce presently has only a small share of the developing US-Mexico trade.

Primary Dual Time Line Continuum: Summary

In summary, major exogenous factors affecting US-Mexico maritime transportation were the negative effects of nationalism, as well as a centralist desire to integrate the Mexican economy during the 1910s and 1920s using highways and railroads. Moreover, the maritime transport sector was severely hampered from the 1930s to the early-1980s by Mexico's import substitution policy and progressive trade barriers, which diminished the importance of international commerce and its associated transportation infrastructure. The marine transport sector was further hindered in the 1940s and 1950s when Mexico improved its highway and rail networks

in the north to accommodate increasing US exports of essential capital goods and raw materials. Regardless, these upgrades ultimately proved to be beneficial to all modes because efficient highway and rail networks are now essential to international intermodal commerce.

Mexico continued to reject new maritime technologies, such as containerization, that were revolutionizing global commerce during the 1950s and 1960s. The importance of ocean-liner transportation in US-Mexico commerce was minimal at that time because Mexico established its maquiladora production industry along the US border. This led to new relationships between shippers and land transport carriers in the north, while maritime and air transportation were sidelined. US-Mexico waterborne commerce improved somewhat during the 1970s, but the primary growth was in domestic and regional coastal shipping. Mexico upgraded its port infrastructure to handle increasing coastal trade, but did not invest in any container handling technology until the mid- to late-1970s. Mexico's import substitution policy continued to disrupt the development of a more efficient transport system, which is crucial to successful intermodal operations.

The discovery of huge oil deposits in the late-1970s initiated a period of severe corruption at Mexican ports, which caused shippers and carriers to find alternative modes of transport, i.e. trucking and rail. Also, Mexican ports

were overly influenced by the demands of the oil giant, PEMEX, which wielded control over port development on the Gulf coast to suit its needs.

After the Mexican economy crashed in 1982, President de la Madrid initiated new policies to allow his country to compete more effectively in global commerce by further developing the Mexican manufacturing industry. US-Mexico maritime transportation was relatively stagnant during the early-1980s, as Mexico dealt with severe financial problems. Ocean transportation began to experience new growth around 1985 after import substitution was eliminated and new trade reforms took effect. Throughput at Mexican container ports began to improve due to rapid growth in Mexico's manufacturing sector. Nationalism, however, continued to delay the introduction of foreign investment and expertise to the country's transportation system. Corruption and cargo theft still plagued the Mexican waterfront during the mid-1980s, while shipper relationships grew stronger with trucking and rail firms.

In 1986, Mexican President de la Madrid initiated additional economic reforms and trade liberalization policies to turn the economy around. These reforms subsequently led to a tremendous increase in manufactured output, much of which was from the maquiladora industries. Cargo flows were picking up in all modes of transport during the mid- to late-1980s, while throughput at Mexican container ports continued

to rise. President Salinas assumed the presidency in 1988 and bolstered the successes of President de la Madrid by initiating export-oriented reforms. President Salinas rejected the past policies of import substitution and protectionism, as well. He also realized that an efficient transportation system was crucial to effective competition in the global market. Mexican ports were finally allocated over $400 million in 1989 to address desperately needed improvements brought on by years of neglect. President Salinas focused on eliminating corruption, substandard infrastructure, and other inefficiencies at Mexico's container ports. That year represented a major turning point for US-Mexico maritime transportation.

The Mexican economy began to stabilize even further after Mexico renegotiated its huge external debt in 1990. This generated increased interest by foreign investors. The huge European Economic Area and Association of Southeast Asian Nations trading blocs were formed in 1991 and 1992, respectively. This provided an even greater impetus for the US, Mexico, and Canada to successfully complete negotiations on a North American Free Trade Agreement similar to the US-Canada Free Trade Agreement of 1989. Such a move was deemed necessary to effectively compete in today's global market. These negotiations occurred at a time when north-south cargo flows were booming and it was widely believed that NAFTA would reinforce this trade.

By 1992, manufactured goods made up the majority of US-Mexico commerce. Mexicans had more purchasing power at that time because of trade liberalization and they bought more imported goods. This was encouraging for ocean-liner operators because they depend on general cargo as the mainstay of the sector. Container throughput at Mexican ports was steadily improving by 1992. Moreover, the US, Mexico, and Canada signed the North American Free Trade Agreement that year, which was designed to eliminate all tariffs and trade barriers between the three countries by 2008. The signing of NAFTA created an even greater interest in Mexico by foreign investors and businesses. Thus, US-Mexico trade drastically increased in anticipation of the agreement and President Salinas initiated a $14 billion transportation and communications upgrade program to handle the growth. Nevertheless, ocean transport still hauled only about 8.5 percent of total US-Mexico commerce, while trucking continued to dominate cargo flows.

Container hijackings on Mexican highways, however, were beginning to damage the trucking sector's reliability. Ocean transportation and double-stack train services, which are both more secure than trucking, were gaining additional attention as a result. Rapid developments in all sectors of the US-Mexico trade since 1989 were making the prospect of market entry increasingly more attractive to both larger and smaller ocean carriers.

By 1993, Mexican austerity measures had reduced inflation, the trade deficit, and interest rates. In fact, Mexico was the United States' fastest growing export market that year. Total 1993 US-Mexico trade was worth over $80 billion and major transportation infrastructure upgrade projects were well underway throughout Mexico. Truck hijackings, however, had doubled from 1992 figures as a result of rapidly increasing cargo flows. In the maritime transport sector, President Salinas passed legislation in 1993 to turn over Mexican port operations to the new semi-autonomous port administrations being formed nation-wide. These were open to 49 percent private investment and would oversee the further subdivision of port services and operations concessions. Port concessions were open to 100 percent foreign investment. This difficult task was undertaken to decentralize the Mexican port system and improve its productivity. The first semi-autonomous port administration was in place by August 1993. Benefits were quickly realized from this policy; Mexican ports handled over 460,000 TEUs in 1993. They only moved less than 100,000 TEUs in 1984. Throughput at Mexican container ports was clearly rising.

Latin American container flows were rapidly increasing by 1993 due to significant container-related infrastructure upgrades and trade liberalization throughout the region. The growing north-south trade attracted several large ocean

carriers to the Latin American trade. These vessels incorporated Mexican and other Latin American ports into their main-line itineraries; many smaller, cross-Gulf traders also began liner services at that time. Despite the promising outlook for ocean transportation in the US-Mexico trade, a 1993 study of shippers revealed that air, trucking, and rail services were perceived as being superior to waterborne transportation. This is widely considered to be one of the greatest problems affecting ocean carriers in the 1995 US-Mexico trade.

On January 1, 1994, the North American Free Trade Agreement went into effect, which caused the already expanding US-Mexico trade to grow even faster by immediately eliminating tariffs on many products. Ocean transportation (and every other mode in the trade) hauled record volumes of cargo that year as a result. Mexico had also become one of the world leaders in low-cost manufacturing and was generating tremendous output. This was very important to ocean-liner services in the US-Mexico trade because they are highly dependent on manufactured goods to generate volume and revenue. Severe border congestion and a rise in container hijackings on Mexican highways led many shippers and freight companies to consider incorporating all-water services into their operations, particularly for non-maquiladora commerce. Throughput at the improving Mexican container ports continued to increase, as it has done since at least 1985.

In 1994, the Maritime Administration said that inter-America trade was the fastest growing sector of US commerce. This signified a major change in the international maritime industry, which was finally paying more attention to dynamic north-south trades instead of completely focusing on sluggish east-west routes. Moreover, several major ocean carriers in the US-Mexico trade underwent fundamental transformations in the promotion of their services. American President Lines (APL), for example, began promoting new all-water services to the rapidly improving Mexican container ports instead of using its intermodal land-bridge connections to haul Mexico-bound cargo south from US ports. It made this substantial changeover to counter losses from the growing number of container hijackings it was experiencing on Mexican highways. It also did so to avoid customs delays and border congestion.

Mexico's port upgrade program was largely completed by the end of 1993 and attention was subsequently directed towards privatizing the ports under semi-autonomous administrations. This task was completed by September 1994 and the huge bureaucracy, Puerto Mexicanos, was liquidated because it had achieved its goal after operating for five years. Even though productivity at Mexican container ports was at an all-time high, private concessions were still bogged down in bureaucratic red tape. The Mexican government had been indicating for two years that new bidding rules for private port concessions, which were open to 100 percent

foreign ownership, were imminent. This created skepticism among potential foreign investors. Regardless, many carriers saw great potential in the trade and maintained interest in bidding on these port operations, despite the regulatory delays.

Mexico had several other problems in late 1993 and throughout 1994 that also made foreign interests uneasy about committing capital towards non-liquid investments. Peasant uprisings in Chiapas and two high-level political assassinations created a significant degree of instability in regard to Mexico's expanding economic prosperity. These events did not go unnoticed and many investors kept their assets in more liquid forms, which could be quickly removed if problems arose. Also, President Salinas was leaving office and would be turning the presidency over to newly elected Ernesto Zedillo, who remained untested in his leadership ability.

Most financial experts knew the Mexican Peso was overvalued and it finally began to lose value in December 1994. President Zedillo decided to let the peso float free of the US Dollar to settle at its true market value. Mexico had been propping up the value of its monetary unit for the past few years by printing more money, so an adjustment was overdue. While this may have seemed like a good idea at the time, the peso took an immediate 39 percent dive in value and caught the world financial market off guard. Nobody thought

it would fall so badly in just a few days. Capital flight ensued because of the highly-liquid nature of most foreign investments in Mexico at that time. This sent the Mexican economy into chaos.

In early-1995, most carriers in the US-Mexico transport sector were faced with huge order cancellations and severe congestion in Mexican seaports, airports, along the border, and at inland intermodal yards. While Mexico's exports were actually expected to increase, due to their lower cost in the global market after December 1994, southbound shipments were dealt a serious blow. Regardless, most carriers with a genuine interest in the trade view the crisis as being short-term in nature. They plan to maintain operations in Mexico, although some services may be reduced for now.

In order to raise urgently needed capital, Mexico initiated an emergency $14 billion privatization plan in January 1995. It included power generation, as well as rail, airport, and seaport concessions. President Zedillo was also successful in overcoming Mexican nationalism by pushing through a constitutional amendment to open up the state-owned railroad to foreign investment. Aside from the immediate capital value of this move, privatizing FNM was fundamentally crucial to improving the efficiency of Mexico's intermodal network. This railroad is presently considered to be the weak link in the Mexico's transport system, which makes it a serious obstacle to long-term growth in US-Mexico commerce.

New inflows of technology, managerial skills, and more secure investment capital will greatly benefit FNM, and any other mode using it as an intermodal connection, over the long-term. Major ocean carriers have also expressed interest in operating intermodal rail links that are scheduled for upgrading under a $16.7 billion transportation infrastructure improvement plan approved in 1994. These rail lines will permit double-stack trains to operate between major Mexican container ports and large interior industrial regions. The Mexican government also accelerated the release of bidding rules for primary container port concessions under the 1995 emergency privatization plan. These were the most sought after by foreign shipping investors, who had been waiting since 1993 to bid on them.

Much of the economic turmoil in Mexico ensued because the government artificially propped up the peso to create an illusion of a safe foreign investment market. Instead, Mexico should have set aside nationalistic policies years ago and promoted long-term foreign investments in the critical sectors of its economy. In Mexico's transportation sector, for example, readily available foreign investment could have brought about tremendous improvements in productivity, technology-transfers, managerial experience, and greater efficiencies in the overall network. It would have required foreign interests to make long-term capital investments that could not be removed at the first sign of trouble. President

Salinas himself said there was absolutely no reason to keep FNM on the constitutional list of strategic national industries.

Now Mexico is being forced to take all of these measures. Its outdated, revolutionary concerns regarding foreign control appear to have, once again, dealt a serious blow to the health of the Mexican economy. Regardless, Mexico seems to realize that in order to for it to effectively participate in global trade and improve its standard of living, the country will have to have to abandon these isolationist policies. Fundamental changes often occur only after major crises. Proactive measures, however, are generally preferable to reactionary ones. Regardless, Mexico still has tremendous potential in the global marketplace and will probably come out of the current economic turmoil stronger than before.

The US-Mexico transport sector may also emerge from the peso crisis in a more stable condition now that true progress is forthcoming on marine terminal, airport, and railroad concessions. It is highly unlikely that FNM would have been privatized without this economic disaster. Mexico also would have continued to drag out the awarding of marine and air terminal concessions, as well. Regardless, the quicker the Mexican government releases these concessions, the sooner it will benefit from new and far more secure investments by carriers genuinely interested in the trade. They will raise

the Mexican transportation system to a much greater level of efficiency, which will benefit both the country and the entire US-Mexico trade.

Many air, land, and ocean carriers believe in the long-term potential of the trade and are positioning themselves to capitalize on its anticipated future growth. The incremental benefits of NAFTA, many of which have yet to be realized, are expected to generate consistent, long-term growth in the US-Mexico trade once the peso crisis passes. Ocean carriers have a tremendous opportunity to enter into a developing trade with strong, long-term growth potential.

Secondary Dual Time Line Continuum

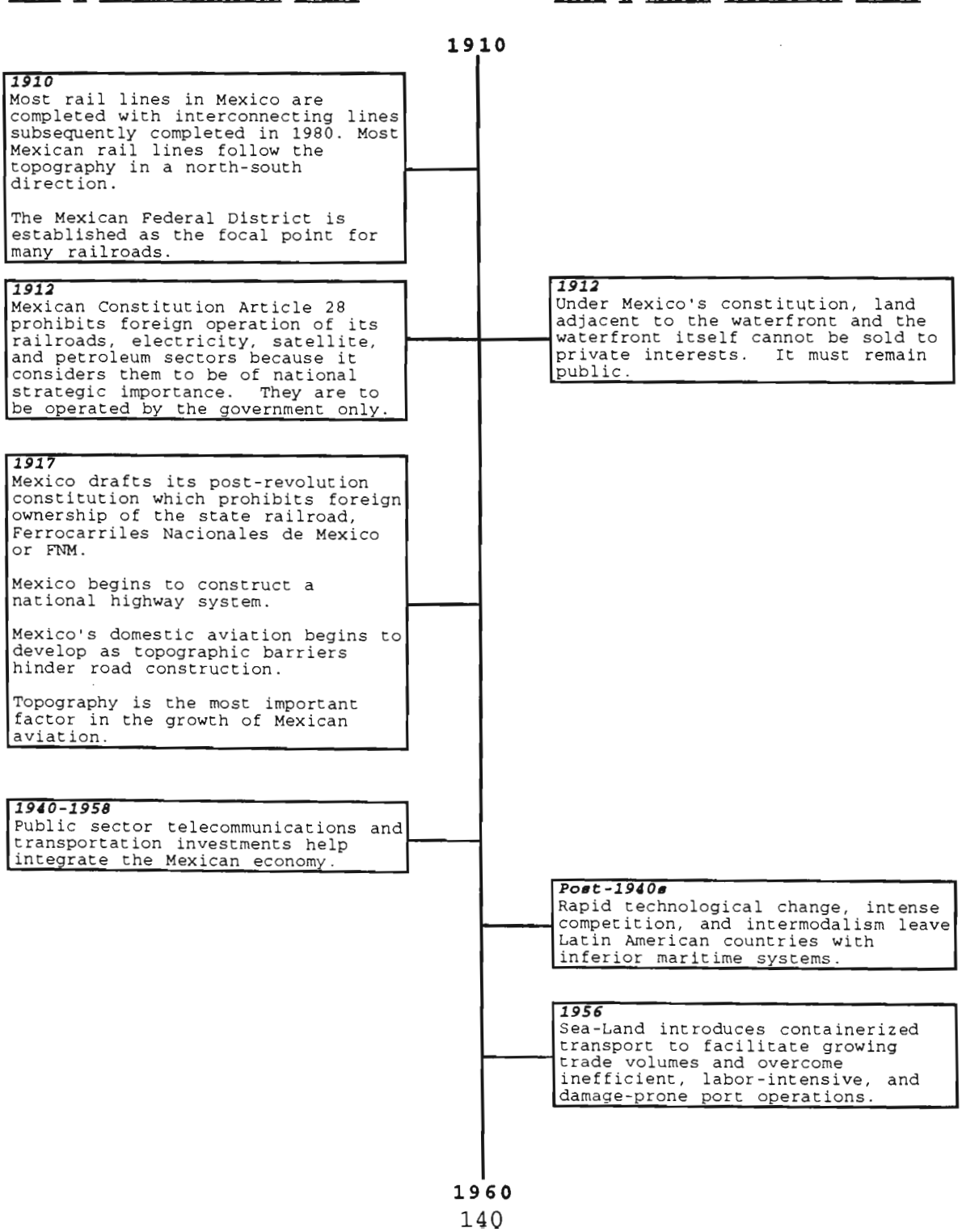
The second continuum, as described in the methodology, arrayed major transportation events (excluding waterborne transportation) against major and minor water transport events by date of occurrence. The primary objective was to reveal major exogenous and endogenous forces from the overall chain of relevant events that may be directly affecting maritime transportation in the US-Mexico trade. It was also necessary to concurrently interpret their significance to the study problem. This portion of the overall analysis, however, did not attempt to explain each event in detail. The continuum was partitioned into three separate epochs, each comprising a relatively uniform number of events, for further analysis.

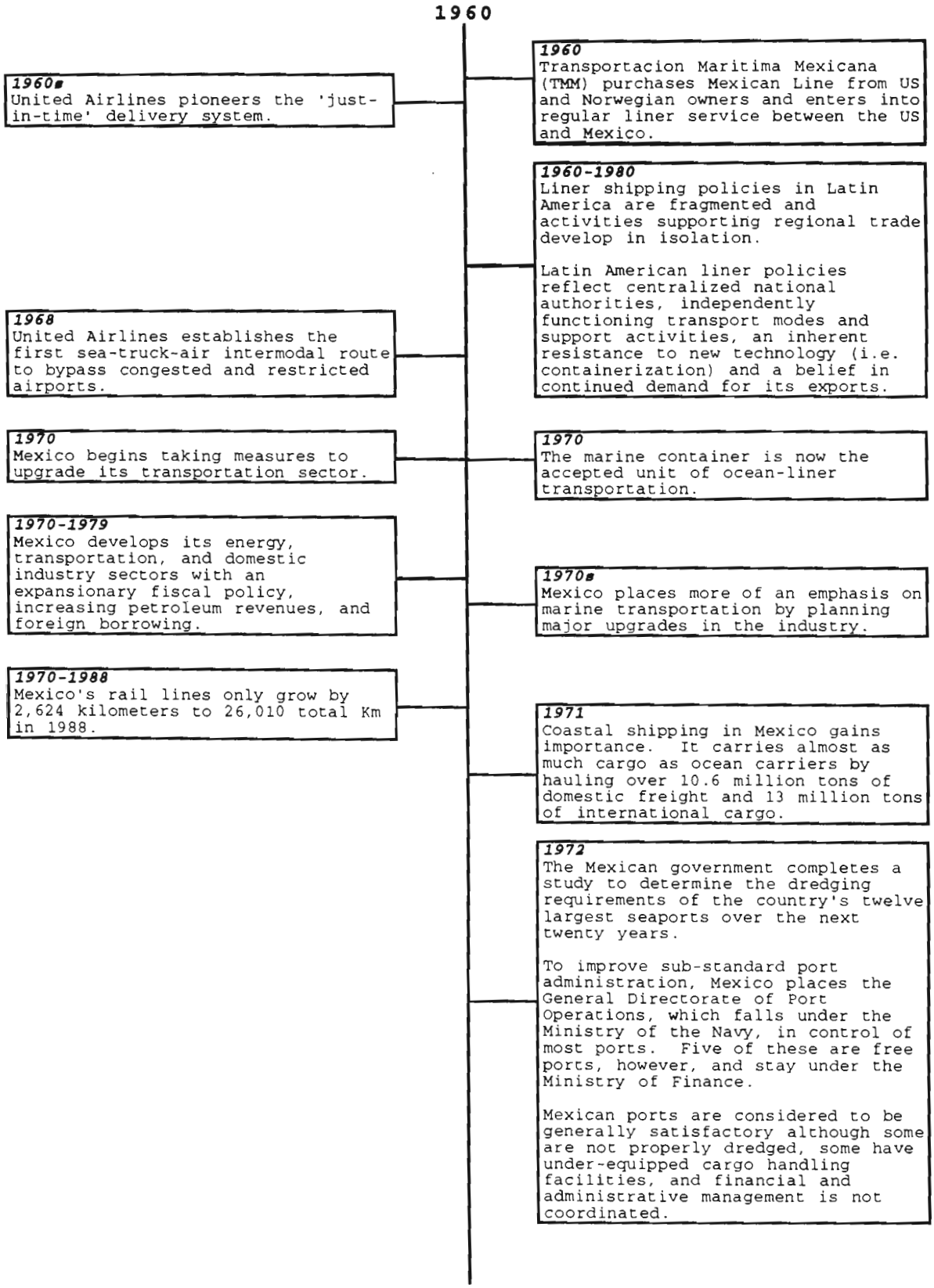
Epoch One (1910-1992)

Epoch One was analyzed first and comprised the years 1910 to 1992 on a variable time scale. See Figure 5. In 1910, the Mexican Revolution began and opposition leaders had already written a draft constitution by 1912. It contained provisions that prohibited the foreign operation of strategic national industries, such as energy and railroads. The draft constitution also prohibited private ownership of land adjacent to the waterfront, as well as the waterfront area itself. Foreign investment in non-strategic industries was also limited to a 49 percent share, at best. Revolutionary leaders clearly wanted to maintain control over these important industries to prevent a recurrence of foreign and upper class domination over key sectors of the economy. The new Mexican government began constructing a national highway system in 1917 and expanded the country's rail system to further integrate the population. Mexican ports, however, received little attention from the new government. It was subordinated to other modes in the continuing drive to integrate Mexico. Regardless, the Mexican government continued to improve the country's communications and transport system through the 1940s and 1950s. Many new technologies, such as containerization, were appearing in global shipping after the 1940s and competition was becoming intense among international ocean carriers. Nevertheless, many Latin American countries, including Mexico, continued to

FIGURE 5

SECONDARY DUAL TIME LINE CONTINUUM (1910-1992)
(EPOCH ONE - BY DATE AND EVENT)




1960
1960
Transportacion Maritima Mexicana (TMM) purchases Mexican Line from US and Norwegian owners and enters into regular liner service between the US and Mexico.
1960-1980
Liner shipping policies in Latin America are fragmented and activities supporting regional trade develop in isolation.
Latin American liner policies reflect centralized national authorities, independently functioning transport modes and support activities, an inherent resistance to new technology (i.e. containerization) and a belief in continued demand for its exports.
1970
The marine container is now the accepted unit of ocean-liner transportation.
1970s
Mexico places more of an emphasis on marine transportation by planning major upgrades in the industry.
1971
Coastal shipping in Mexico gains importance. It carries almost as much cargo as ocean carriers by hauling over 10.6 million tons of domestic freight and 13 million tons of international cargo.
1972
The Mexican government completes a study to determine the dredging requirements of the country's twelve largest seaports over the next twenty years.
To improve sub-standard port administration, Mexico places the General Directorate of Port Operations, which falls under the Ministry of the Navy, in control of most ports. Five of these are free ports, however, and stay under the Ministry of Finance.
Mexican ports are considered to be generally satisfactory although some are not properly dredged, some have under-equipped cargo handling facilities, and financial and administrative management is not coordinated.
1960s
United Airlines pioneers the 'just-in-time' delivery system.
1968
United Airlines establishes the first sea-truck-air intermodal route to bypass congested and restricted airports.
1970
Mexico begins taking measures to upgrade its transportation sector.
1970-1979
Mexico develops its energy, transportation, and domestic industry sectors with an expansionary fiscal policy, increasing petroleum revenues, and foreign borrowing.
1970-1988
Mexico's rail lines only grow by 2,624 kilometers to 26,010 total Km in 1988.
1973

1973

1973
Mexico has about 14,700 miles of rail lines.

1973
Mexico's merchant marine consists of 650,000 gross registered tons. Of this, 350,000 tons are PEMEX tankers.

Transportacion Maritima Mexicana (TMM) operates 33 ocean-going vessels.

1974
Mexican Association of Transport Users (AMUTMAC) is founded.

Aviation is developed in Mexico but little air freight is carried.

Trucking dominates freight shipments up to a distance of around 160 miles. Beyond that, rail and air transportation begin predominating shipments.

Mexico's state-owned railways have continual deficits because losses from subsidized passenger service overrides freight profits.

Mexican railroads haul mostly minerals, non-perishable products, forest products, and heavy industrial materials. Perishable goods and higher-value cargo move by other modes of transport.

Mexico investigates the idea of constructing a trans-isthmus rail line between the ports of Salina Cruz and Coatzacoalcos to compete for Panama Canal cargo. Both ports would also have to be upgraded to accommodate container shipments.

Mexico has 1,200 airports and airstrips. About 200 of these are state-owned.

Mexico announces higher rail rates for both passengers and freight in an effort to make its state-owned railroads self-supporting. It also begins an equipment upgrade program to improve efficiency.

1974
Marine transportation is currently the weak link in Mexico's transportation system. Nevertheless, it is still functional.

Mexico has over 50 seaports. Of these, 36 are deep water ports. None of them have good natural harbors.

Five Mexican ports handle 80 percent of the country's total tonnage by water. They are Veracruz, Tampico, Guaymas, Mazatlan, and Manzanillo.

The Port of Veracruz is a major gateway for imports heading to Mexico City.

The Port of Guaymas has large capacity but is underutilized due to longer transits needed to get around the Baja Peninsula.

The Port of Tampico is primarily a petroleum port that has a large refinery nearby.

Mexico signs the LAFTA Water Transportation Agreement which reserves all cargo moving between party states for party-state carriers. Mexico hopes this will stimulate growth in its merchant marine.

The Mexican ports of Tampico, Salina Cruz, Coatzacoalcos, and Tuxpan are the country's major coastal shipping ports.

Mexico has paid less attention to maritime transportation because so much cargo moves by truck and rail between the US and Mexico.

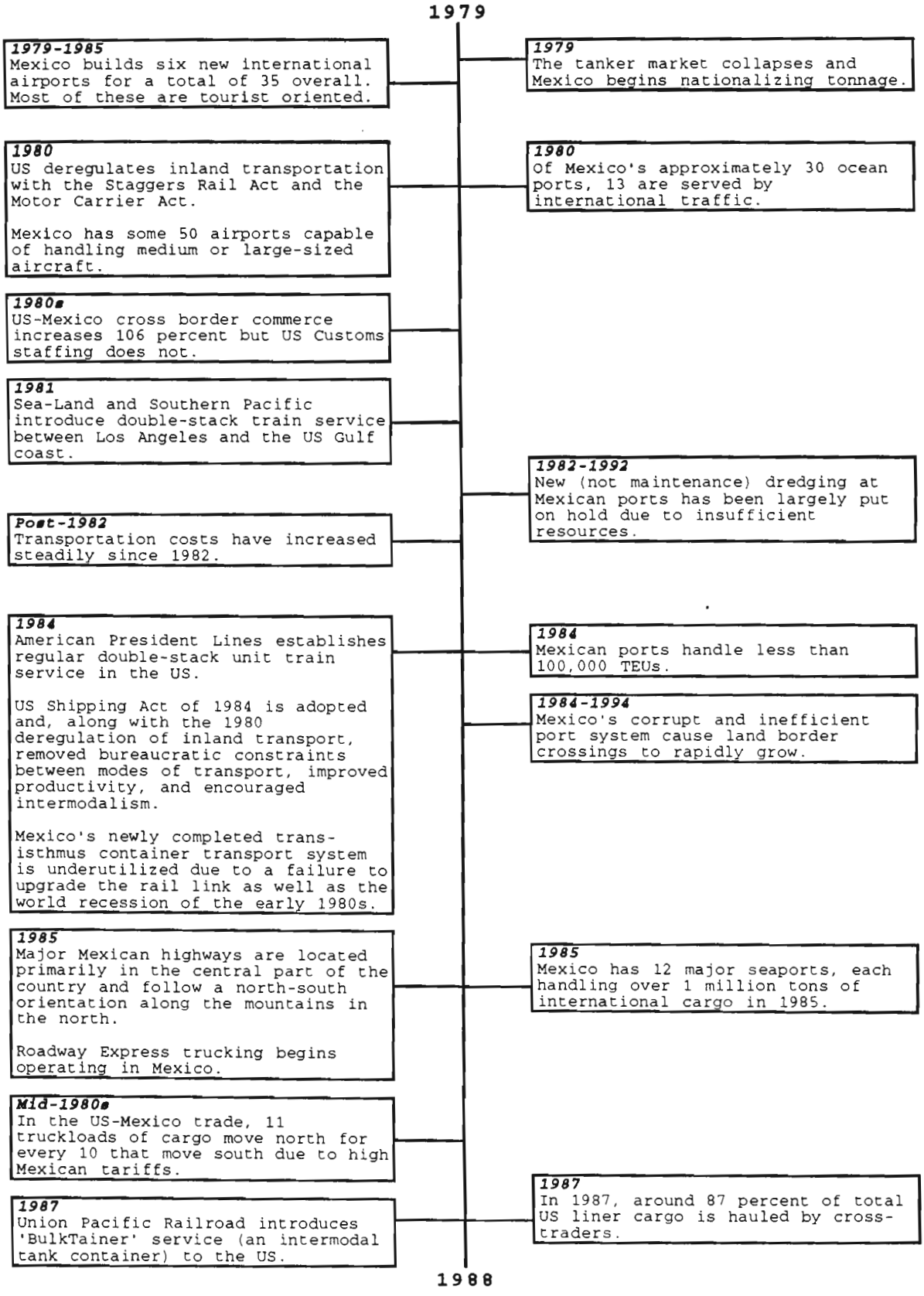
Mexico only has around 2,000 miles of navigable inland waterways, most of which are shallow.

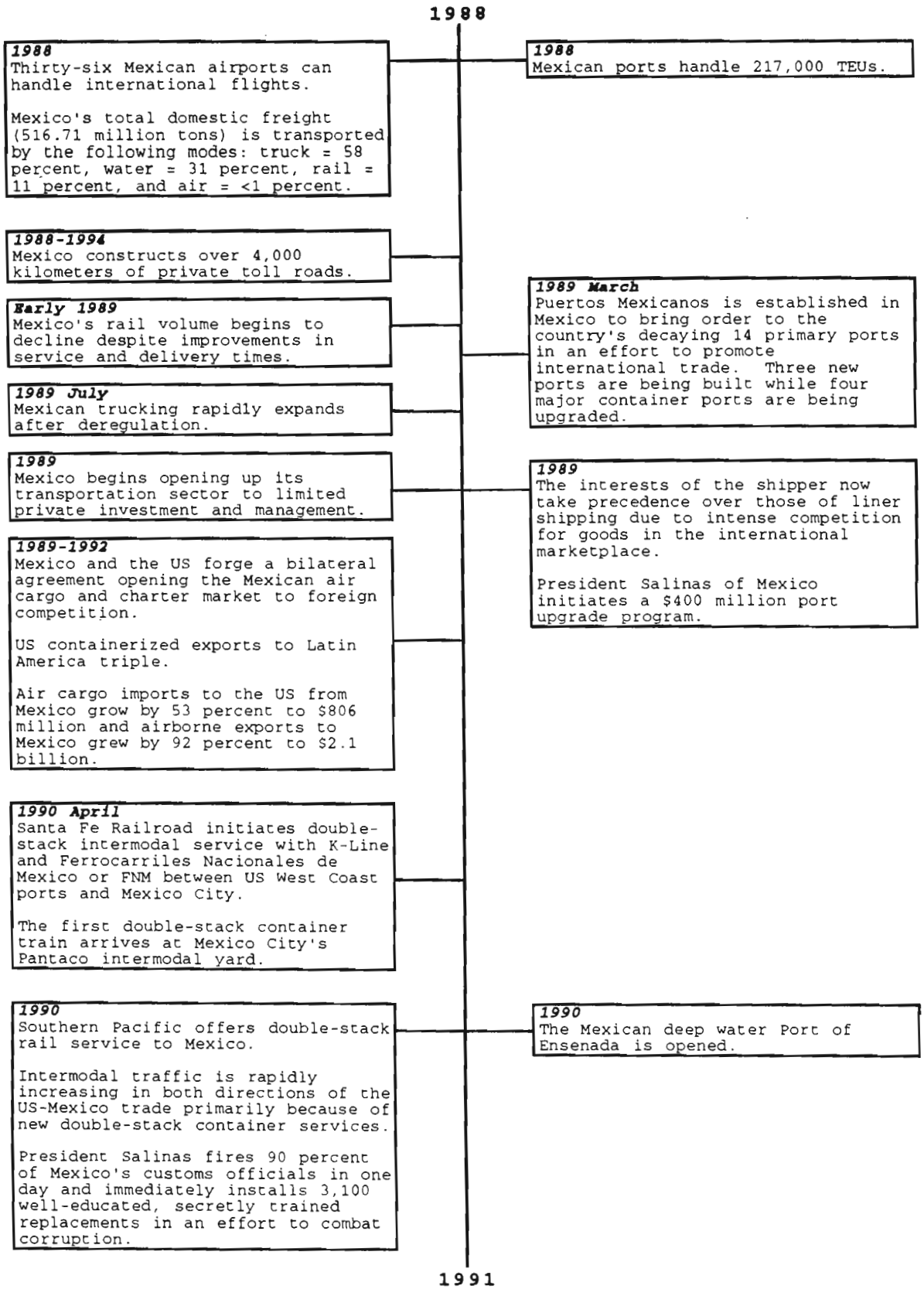
1975
Latin American countries begin to significantly invest in containerized transport.

1975
Liner companies extensively utilize land-bridge systems and limit the number of ports called.

1977
The International Organization for Standardization (ISO) publishes its recommended freight container dimensions.

1979


1979
1979-1985
Mexico builds six new international airports for a total of 35 overall. Most of these are tourist oriented.
1979
The tanker market collapses and Mexico begins nationalizing tonnage.
1980
US deregulates inland transportation with the Staggers Rail Act and the Motor Carrier Act.
Mexico has some 50 airports capable of handling medium or large-sized aircraft.
1980
Of Mexico's approximately 30 ocean ports, 13 are served by international traffic.
1980s
US-Mexico cross border commerce increases 106 percent but US Customs staffing does not.
1981
Sea-Land and Southern Pacific introduce double-stack train service between Los Angeles and the US Gulf coast.
1982-1992
New (not maintenance) dredging at Mexican ports has been largely put on hold due to insufficient resources.
Post-1982
Transportation costs have increased steadily since 1982.
1984
American President Lines establishes regular double-stack unit train service in the US.
US Shipping Act of 1984 is adopted and, along with the 1980 deregulation of inland transport, removed bureaucratic constraints between modes of transport, improved productivity, and encouraged intermodalism.
Mexico's newly completed trans-isthmus container transport system is underutilized due to a failure to upgrade the rail link as well as the world recession of the early 1980s.
1984
Mexican ports handle less than 100,000 TEUs.
1984-1994
Mexico's corrupt and inefficient port system cause land border crossings to rapidly grow.
1985
Major Mexican highways are located primarily in the central part of the country and follow a north-south orientation along the mountains in the north.
Roadway Express trucking begins operating in Mexico.
1985
Mexico has 12 major seaports, each handling over 1 million tons of international cargo in 1985.
Mid-1980s
In the US-Mexico trade, 11 truckloads of cargo move north for every 10 that move south due to high Mexican tariffs.
1987
Union Pacific Railroad introduces 'BulkTainer' service (an intermodal tank container) to the US.
1987
In 1987, around 87 percent of total US liner cargo is hauled by cross-traders.
1988


1988
1988
Thirty-six Mexican airports can handle international flights.
Mexico's total domestic freight (516.71 million tons) is transported by the following modes: truck = 58 percent, water = 31 percent, rail = 11 percent, and air = <1 percent.
1988
Mexican ports handle 217,000 TEUs.
1988-1994
Mexico constructs over 4,000 kilometers of private toll roads.
Early 1989
Mexico's rail volume begins to decline despite improvements in service and delivery times.
1989 July
Mexican trucking rapidly expands after deregulation.
1989
Mexico begins opening up its transportation sector to limited private investment and management.
1989-1992
Mexico and the US forge a bilateral agreement opening the Mexican air cargo and charter market to foreign competition.
US containerized exports to Latin America triple.
Air cargo imports to the US from Mexico grow by 53 percent to $806 million and airborne exports to Mexico grew by 92 percent to $2.1 billion.
1990 April
Santa Fe Railroad initiates double-stack intermodal service with K-Line and Ferrocarriles Nacionales de Mexico or FNM between US West Coast ports and Mexico City.
The first double-stack container train arrives at Mexico City's Pantaco intermodal yard.
1990
Southern Pacific offers double-stack rail service to Mexico.
Intermodal traffic is rapidly increasing in both directions of the US-Mexico trade primarily because of new double-stack container services.
President Salinas fires 90 percent of Mexico's customs officials in one day and immediately installs 3,100 well-educated, secretly trained replacements in an effort to combat corruption.
1989 March
Puertos Mexicanos is established in Mexico to bring order to the country's decaying 14 primary ports in an effort to promote international trade. Three new ports are being built while four major container ports are being upgraded.
1989
The interests of the shipper now take precedence over those of liner shipping due to intense competition for goods in the international marketplace.
President Salinas of Mexico initiates a $400 million port upgrade program.
1990
The Mexican deep water Port of Ensenada is opened.
1991

1991

1991 May
American President Co. initiates through rail service with Union Pacific and Ferrocarriles Nacionales de Mexico between the US Midwest and Mexico City.

1991 June
The Mexican government seizes the Port of Veracruz when it fails to submit a master plan for improving its productivity and efficiency. Union bosses are jailed, union contracts are canceled, and terminal operations concessions are opened to competition.

The Mexican deep water Port of Topolobampo is opened.

1991 July
Puertos Mexicanos begins improving port infrastructure in Veracruz.

Puertos Mexicanos has received 71 requests totaling $3 billion from interested private investors.

1991 August
TMM begins its own stevedoring operation at the port of Veracruz to improve throughput efficiency.

Fruit carriers in the Latin America-US trade operate as common carriers to fill empty cargo space on return voyages. This depresses freight rates due to overcapacity.

Mexico passes a port law which requires all waterfront labor unions to disband and reorganize as new, private companies if they wish to provide stevedoring services.

1991 December
Thompson Shipping begins hauling reefer cargo between Tampa and Progreso.

1991
Pantaco is now Mexico's number two container handling yard in TEUs following the Port of Veracruz.

Rail cargo in the US-Mexico trade is around 3.5 million tons northbound and 10.8 million tons southbound.

1991
Mexico's port system handles 375,000 TEU containers. Puertos Mexicanos estimates this figure will be around 1 million TEUs by the year 2000.

Puertos Mexicanos releases a report stressing the crucial role of the nation's port system in President Salinas' plan to generate economic growth by promoting non-petroleum exports.

Puertos Mexicanos plans to spend $95 million this year on nine major port construction and maintenance projects. It also plans to spend another $42.5 million on port superstructure (i.e. equipment).

Puertos Mexicanos reports a nationwide growth of 6.1 percent in container traffic.

Canada's waterborne trade with Mexico is less than 1 million tons or .5 percent of the total trade.

1992

Sources: See Appendix B, p. 335 for a list of general literature reviewed.

pursue long-established protectionist trade practices like import substitution. This led to the development of many inferior maritime systems. During the 1960s, Mexico adopted several regional liner policies that led to even greater inefficiencies. These policies reflected the isolationist, highly-centralized Latin American governments that devised them. The region continued to reject new developments in transportation, such as containerization, intermodalism, and just-in-time deliveries. This progressively undermined the entire Latin American transportation system. These countries were developing independently of each other, as were individual sectors within their respective economies, and they remained unable to effectively compete in global commerce. More emphasis, however, was placed on manufactured goods during the 1960s; cargo that is crucial to ocean-liner operations.

In the early-1970s, Mexico began to upgrade its transportation network under an expansionary fiscal policy that included increasing petroleum revenues and external borrowing. This improvement plan also included measures to upgrade Mexican ports with amenities, such as new warehouses. Containerized transport had gained, at least among developed countries, widespread acceptance as the primary means for moving liner cargo by 1970. Mexico, however, continued to reject this capital-intensive innovation even when it had a good opportunity to adopt it. Mexico chose instead to

improve its coastal shipping facilities (i.e. dry bulk and break-bulk), as well as its tanker terminals. Coastal shipping made tremendous gains, relative to conventional shipping, by 1971. In fact, Mexican coastal shipping and conventional ocean transport handled almost equal amounts of cargo that year, most of which was international freight. The government also began studies to determine the dredging needs of its major ports for the next twenty years and placed all but the five largest general cargo ports under the Ministry of the Navy to improve substandard port administration. The latter ports handled most of the international commerce and remained under the Ministry of Finance.

Other developments were taking place in Mexico's maritime industry during the early-1970s, as well. By 1973, Transportación Marítima Mexicana was Mexico's largest ocean-liner operator with 33 conventional vessels. They comprised much of the country's 300,000 gross registered tons of non-tanker shipping. PEMEX tankships, however, accounted for over half of Mexico's shipping tonnage with about 350,000 gross registered tons. PEMEX is the giant state-owned oil company that is still off-limits to foreign investors. The high ratio of PEMEX to non-petroleum tonnage reflected the importance of oil to the Mexican economy at that time, particularly since the OPEC crisis was taking place and there was an increasing world-wide dependence on oil. Petroleum

revenue was far more important to Mexico than manufacturing throughout the 1970s.

During the mid-1970s, other sectors of the Mexican transport industry were evolving. Air cargo was still very limited, but passenger traffic was increasing. Ferrocarriles Nacionales de Mexico was primarily handling bulk cargoes, such as minerals and heavy industrial materials. Trucking handled most of the US-Mexico higher-value and general cargoes, particularly in the northern half of the country. Ocean transport hauled predominantly liquid and dry bulk commodities, while coastal shipping moved smaller loads of bulk cargoes. Coastal traders also carried longer-haul general cargo on break-bulk vessels. Some of it probably moved in containers, as deck cargo, on the same vessels.

Even though ocean transportation was the weak link in Mexico's transportation system during the 1970s, it was still functional and progressively improving. Mexico was also considering a trans-isthmus land-bridge between the Ports of Salina Cruz and Coatzacoalcos in the southern part of the country to compete for Panama Canal container traffic. The Mexican government had paid much less attention to its maritime transport sector until the 1970s, partially because so much of the US-Mexico trade was moving by truck and rail. The latter modes accounted for most of Mexico's foreign commerce. Moreover, the country had only about 2,000 miles of navigable inland waterways, most of which were shallow.

This greatly diminished the potential for all types of waterborne commerce in the trade. Regardless, Mexico still had 36 deepwater seaports and many other smaller ones. They were mainly fishing, liquid bulk (particularly tanker terminals on the Gulf coast), dry bulk, general cargo, roll-on/roll-off, multi-purpose, and a few planned container ports.

In the mid-1970s, Latin American countries finally began to significantly invest in container handling facilities. For Mexico, however, this occurred at a time when major ocean-liner operators began to extensively utilize land-bridge systems, which limited the number of ports served. Just because a country had container handling infrastructure, however, did not guarantee ship traffic. Containerized transportation was becoming highly specialized by the mid-1970s and the International Standards Organization (ISO) published recommended freight container dimensions in 1977. Mexico had a long way to go to catch up to international levels of competition. To further complicate the situation, large inflows of petroleum revenues led to widespread corruption throughout many sectors of the Mexican economy, including the port system. Mexico's general cargo ports were very inefficient and plagued by crime at that time. Moreover, PEMEX dominated port development throughout the decade to suit its needs, particularly on the Gulf coast. PEMEX was able to do so because it was the country's largest

source of external revenue. General cargo facilities were once again subordinated within the overall transport system. Thus, non-petroleum shippers had very little experience with maritime transportation at that time.

Mexico also lost favor in the international community during 1979 when the tanker market collapsed and it began nationalizing tonnage. It had previously nationalized the country's oil industry in 1938 and would do the same to the banking industry in 1982. These actions clearly did not encourage private investment in the Mexican economy.

During the early-1980s, the international oil market collapsed and global interest rates climbed. A major debt crisis set in when Latin American countries were unable to pay the interest on their huge external debts. Mexico was forced to undertake drastic austerity measures. It was forced to suspend infrastructure upgrades, in the port and other transport sectors, from 1982 until at least 1988. New dredging was put on hold until 1992. Manufacturing, however, continued to rapidly expand in Mexico and became more important to the economy than petroleum by 1986. US-Mexico general cargo flows were increasing throughout the 1980s, which coincided with the deregulation of US inland transportation in 1980 and the introduction of US double-stack train services during 1981. These events gave trucking and rail a substantial advantage over waterborne transportation, even in non-maquiladora trades. Moreover,

the US Shipping Act of 1984, in conjunction with the deregulation of US inland transportation, encouraged the expansion of intermodalism. These technological advancements were being implemented in the US at a time when Mexico was forced to delay planned improvements in its port system. Thus, it was merely a matter of time before double-stack and intermodal services were extended south to facilitate growing US-Mexico commerce in manufactured goods and foreign container transshipments through US ports. Several motor carriers, such as Roadway Express, began new operations in the US-Mexico trade, as well.

High Mexican tariffs during the mid-1980s created cargo flow and equipment imbalances as Mexico struggled to overcome the 1982 financial crisis. US-Mexico maritime transportation was set back even further when major ocean carriers decided to use land-based intermodal connections out of US ports to avoid the corrupt Mexican waterfront. In fact, land border crossings grew dramatically between 1984 and 1994. Port corruption and inefficiency were major reasons. Also, most of the Mexican highways ran in a north-south direction connecting major industrial regions, which gave trucking a major advantage. East-west intermodal connections out of Mexican ports were poorly developed at that time. This permitted already strong shipper/carrier (i.e. trucking) relationships to develop even further. Mexican container ports handled less than 100,000 TEUs in 1984 even though it

had 12 major seaports handling international cargoes of various types. Even Mexico's trans-isthmus container transport system had minimal volumes because the government failed to upgrade the rail link between the Ports of Salina Cruz and Coatzacoalcos.

During the 1980s, new container technology allowed non-conventional cargo shippers to capitalize on the benefits of containerized transport. In 1987, for example, Union Pacific Railroad introduced an intermodal tank container in the US market, which allowed small lot shipments of liquid and dry bulk cargoes. Also at that time, over 87 percent of all US liner cargo was hauled by cross-traders, which are foreign-flag ships hauling cargo between two other countries. This indicated that an increasing number of shipping companies were providing service to North America on main-line routes and would probably consider the US-Mexico trade if conditions were right. Regardless, traffic began to pick up at Mexican ports in the late-1980s. They handled 217,000 TEUs in 1988. This was probably the result of President de la Madrid's successful austerity program and the expansion of Mexican manufacturing.

After President Salinas took office in 1988, major changes occurred in the country's transportation industry. President Salinas wanted Mexico to become more export-oriented, which would require an overhaul of the country's entire transport system. This was necessary if Mexico hoped

to effectively compete in global commerce. Mexico also began to permit more foreign investment in its transportation industry that year, which had been highly restricted since 1910. Mexico deregulated its trucking industry in 1989, which subsequently expanded rapidly and provided carriers with additional intermodal connections within the country. Moreover, the government began to extensively develop its highway network in 1989 by constructing many miles of new toll roads. Also, a new bilateral air cargo agreement between the US and Mexico helped air transportation to become better established in the trade. It has developed very rapidly since 1989.

President Salinas initiated a $400 million port upgrade program in 1989 and created Puertos Mexicanos to decentralize and improve efficiency at substandard Mexican ports. This was done to bring the ports up to international operating standards and to recapture Mexican container cargo being routed through US ports. Shipper interests were also taking precedence over liner preferences at that time, primarily because of intense international competition for cargo. It was very important to increase productivity at Mexican container ports because shippers would hold carriers accountable for any in-line problems, regardless of cause.

In 1990, Santa Fe Railroad and K-Line initiated double-stack train service between US West coast ports and the Pantaco intermodal yard near Mexico City. US-Mexico

intermodal traffic began to grow even faster at that time, primarily because of new double-stack services. This development further solidified shipper relationships with trucking and rail firms, as did intermodal transshipments of Mexico-bound containers out of US ports.

By 1991, additional double-stack services were available in Mexico, including some from major ocean carriers out of US ports. This increased the pressure on Mexican ports to become more efficient as soon as possible. The US-Mexico trade was steadily growing and ocean carriers would be unable to compete for this cargo without higher productivity at Mexican container ports. Shippers were not interested in the specific causes of delayed or damaged shipments. They were paying for trouble-free service and expected to get it. President Salinas knew that drastic action was needed to accelerate change. In June 1991, he had the Mexican army seize the Port of Veracruz, which was out of control. This move broke the grip of powerful labor unions that had been running the port for years. All waterfront labor unions were forced to disband and reorganize as private stevedoring companies if they wanted to compete for new concessions.

Progress continued on the Mexican port upgrade program throughout the early-1990s. Several new ports were opened, including Ensenada and Topolobampo. By July 1991, conditions were rapidly improving in Veracruz. The Mexican carrier, Transportación Marítima Mexicana (TMM), was becoming a major

diversified shipping company and started its own stevedoring operations at the port. Private investors were showing tremendous interest in the upgrade plan and Puertos Mexicanos received over 70 requests for port concessions that year. Many ocean carriers were also investigating the trade's growing potential while others initiated new services, particularly between US and Mexican Gulf coast ports.

President Salinas officially acknowledged the importance of a healthy port system and focused on expanding trade in non-petroleum exports. Mexican container ports finally began to experience a significant increase in throughput during 1991. Mexican ports handled 375,000 TEUs that year, compared to less than 100,000 TEUs in 1984. Major port infrastructure upgrades were well underway and efficiency was rapidly increasing now that the once-powerful labor unions had been ousted. Nation-wide container flows were up 6.1 percent in 1991 due to Mexico's growing international trade in manufactured goods. The Pantaco intermodal rail yard outside of Mexico City, for example, was handling more containers from stack train and truck shipments than each of the Mexican container ports except for Veracruz. Competition for containerized cargo was rapidly increasing among all modes during the early-1990s. Ongoing negotiations over a North American Free Trade Agreement created even greater interest in the already growing trade.

Another problem arose for maritime transportation during the summer of 1991. Fruit carriers in the US-Latin America trade, such as Del Monte and Dole, began to operate as common carriers on otherwise empty south-bound voyages. This led to overcapacity and depressed freight rates. Increasing overcapacity, in addition to other problems, created even more difficulties for ocean carriers trying to enter the trade. Regardless, solid progress was being made to overcome many of the other problems.

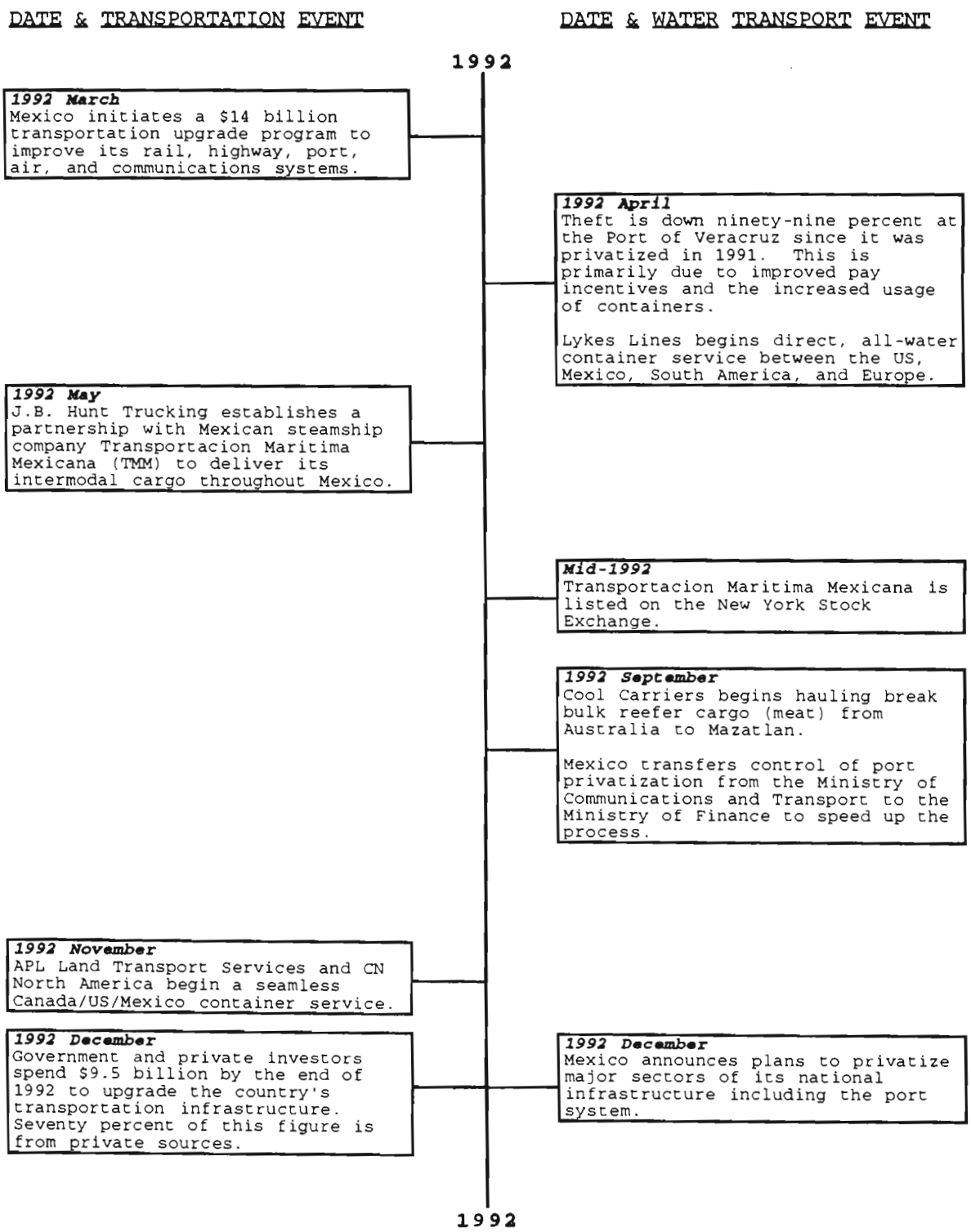
Epoch Two (1992-1994)

Epoch Two was analyzed next and comprised the years 1992 to 1994 on a variable time scale. See Figure 6. In March 1992, President Salinas launched a $14 billion program to upgrade Mexico's transportation infrastructure. Over $9.5 billion of this was spent by the end of the year. More than 70 percent of the latter figure actually came from private investors, which clearly indicated that Mexico was becoming more accommodating to new sources of capital. Foreign interests, however, were still limited to a 49 percent share in most cases. This restriction continued to hinder the true potential of Mexico's transportation system.

Previous improvements to Mexico's transportation network were already showing results by early 1992. In the Port of Veracruz, for example, crime was down 99 percent since the army seized it in 1991. This happened because of higher

FIGURE 6

SECONDARY DUAL TIME LINE CONTINUUM (1992-1994)
(EPOCH TWO - BY DATE AND EVENT)



1992

1992
US Customs allocates over $300 million to upgrade border inspection stations and hire 386 new inspectors in the Southwest.

For the first time, more US intermodal containers move by rail than by truck.

The US enacts the Intermodal Surface Transportation Efficiency Act (ISTEA) to further integrate the country's transportation system.

Mexico constructs 768 kilometers of new roads at a cost of $919 billion.

Mexico allows US railroads to pre-clear commodities in a program called 'despachio previo' so that the paperwork is taken care of by the time the train arrives at the border.

In the US-Canada trade, 85 percent of the cargo moves by land.

1992
Mexico extends port service to 24 hours a day, 365 days a year and simplifies its port tariff system.

Mexico and nine other Latin American countries implement a port state control program to ensure that 15 percent of ships entering their ports comply with IMO safety and pollution regulations by 1994.

Mexico has four major container ports open for service.

Average container throughput at specialized Mexican ports is up to 32 moves per ship per hour compared with 12 per hour in 1988. The goal is to reach 50 moves per hour.

The Port of Singapore is providing training in Mexico's four major container ports.

Mexico spends $126 million on port infrastructure upgrades.

Discussions are taking place on extending the US Gulf Intracoastal Waterway into Mexico. This plan, however, would take years to complete. Other options, such as short-sea routes, are also being considered.

Mexican seaports handle nearly 450,000 TEUs.

US ports handle an estimated 20 percent of Mexico's containerized trans-Pacific cargo.

The ports of Veracruz, Altamira, Lazaro Cardenas, and Manzanillo handle about 73 percent of all container moves through the 15 Mexican ports capable of handling such shipments.

Water transportation handles about 6 percent of US-Canada commerce.

Only 8.5 percent of US-Mexico trade cargo moves by water transport.

1993 February
Tropical Shipping begins liner service to Puerto Morelos near Cancun, Mexico.

1993 March
US transport officials express concern about poor security in Mexico following a number of truck hijackings involving APL containers loaded with high-value cargo.

1993 March
Lykes Lines adds St. John, New Brunswick to its Middle East, US, and Mexico run thus linking all three NAFTA countries with liner service.

Lykes Lines is the only large US carrier providing water transport service to Mexico with its own vessels. Most others use slot charters with TMM, trucking, or double-stack service from US ports.

1993

1993

1993 April
Roadway Package Service begins air cargo service to Mexico City, Guadalajara, and Monterrey.

Early 1993
Cargo Transport Lines establishes liner service between Tampa and Veracruz.

1993 May
Burlington Northern provides a new rail barge service between Galveston, TX and Coatzacoalcos, Mexico. BN has no direct rail links to Mexico.

1993 June
SeaTruck RoRo begins roll-on/roll-off liner service between Galveston, Texas and Veracruz and Coatzacoalcos, Mexico.

1993 July
Mexican Gulf Line and KLLM Trucking announce a new container service between Gulfport, Miss. and Tuxpan, Mexico.

President Salinas reveals a new 'Law of Ports' which sets up semi-autonomous integral port administrations or APIS to oversee administrative and operational activities at Mexican ports such as granting port services concessions to private interests.

1993 August
Mexico announces 27 private port concessions at 15 predominantly liquid and dry bulk terminals and also at a few general cargo terminals.

1993 October
Crowley American Transport begins direct service to Progreso, Veracruz, and Tampico from Port Everglades, FL.

TMM and Hapag-LLoyd overhaul their combined Europe/US/Mexico service by deploying faster ships.

Foreign interests may own up to 49 percent of semi-autonomous integral port administrations or APIS and 100 percent of port service companies.

Mexico creates its first semi-autonomous integral port administration or APIS, which is similar to a US autonomous port district, at the fishing port of Puerto Madero.

CSX de Mexico is granted concessions to build intermodal yards at the Mexican ports of Altamira and Veracruz.

Marmex begins liner service between Long Beach and Topolobampo.

K Line begins liner service between the US West Coast, Mexico, and Central America.

1993

1993

1993 November

TMM is negotiating with APL to improve its intermodal connections in the US with APL's Stacktrain Services.

The US Customs Modernization Act is passed in Congress. Customs can now implement its electronic import processing system called the National Entry Processing System.

1993 December

Mexico becomes one of the eighteen board members of the International Standards Organization. This should help Mexico end the use of local standards to protect domestic industry.

In the US-Mexico trade, 5 truckloads of cargo move north for every 10 that move south creating a large trade imbalance.

Mattel Inc. begins using the new US Customs Automated Invoice Interface system to speed its shipments through customs.

APC de Mexico begins 'in-bond' service for less-than-container load (LCL) shipments in its Asia-Mexico operations.

1993

Road transport accounts for 80 percent of Mexico's domestic freight traffic.

Mexican infrastructure upgrade funding ($13.5 billion) is broken down as follows: highways = 56 percent, communications = 22 percent, railroads = 14 percent, seaports = 3 percent, and airports = 3 percent.

APL Automotive Services uses Autostack container racks to ship autos from Mexico to Michigan.

Federal Express offers direct air cargo service to nine cities throughout Mexico.

Transportation issues regarding the NAFTA countries are being addressed by the Transportation Working Group.

Container hijackings and armed robberies in Mexico double from 1992 figures.

Bridges handle over 70 percent of all US-Mexico commerce.

Intermodal terminals are being constructed at Monterrey and Guadalajara to complement the one already in Mexico City.

Over 1.7 million freight movements occur at the US-Mexico border.

1993 November

Mexico has granted 61 private marine terminal concessions to date.

APL and TMM announce a vessel sharing joint-venture for containers moving between Asia and US/Mexico west coast ports. This provides the first fixed day, direct, all-water service between Mexico and Asia.

Puertos Mexicanos receives 17 international bids for 8 state-owned dredges up for auction.

1993 December

CSX Transportation plans to open intermodal terminals in Veracruz and Altamira in 1994 to facilitate a planned rail car/trailer on barge service from either Mobile or New Orleans.

Mexico accepts bids for five maintenance dredging contracts to service major east and west coast ports.

Mexican Gulf Line suspends liner service between Gulfport, Miss. and Mexico due to insufficient cargo volumes.

The ports of Bellingham, WA and Ensenada, Mexico sign an agreement to increase commerce between the two ports.

1993

Mexico invests $110 million to upgrade port infrastructure.

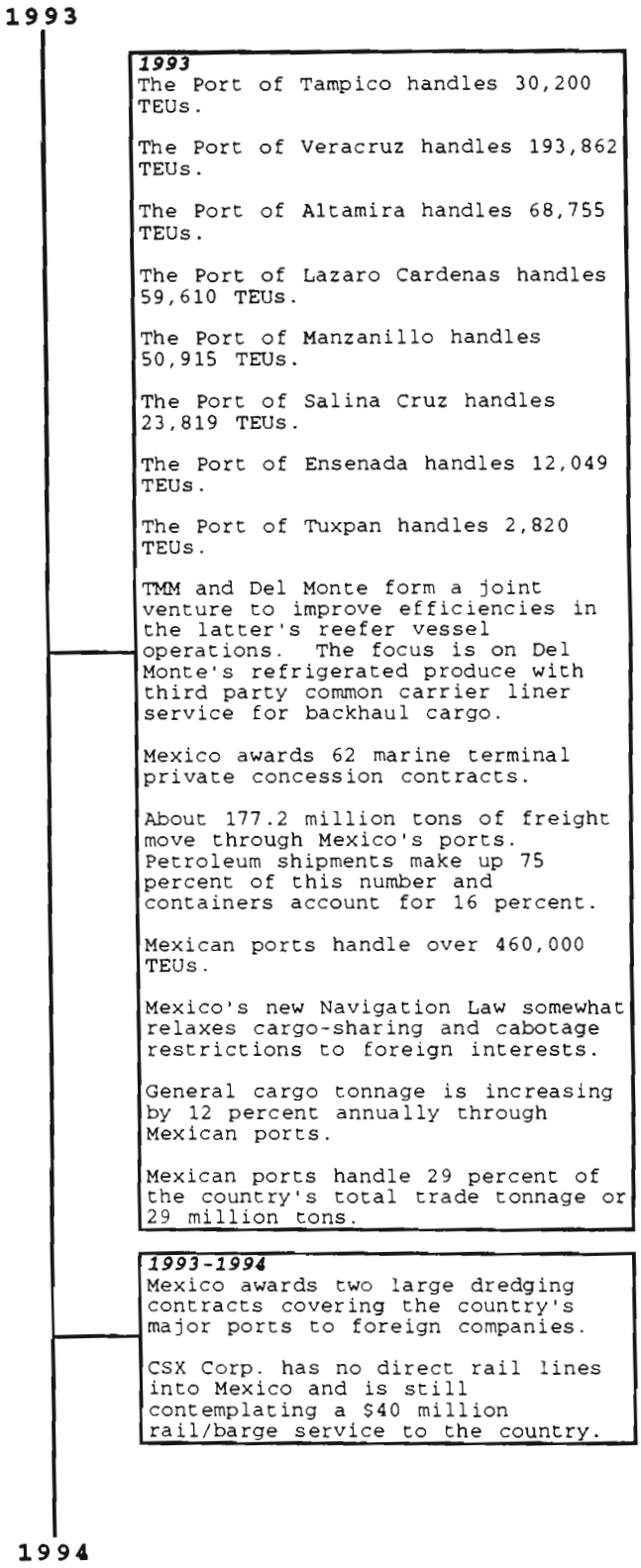
Latin America's container trade drastically improves due to lower trade barriers, product diversification, economic restructuring, and new services by liners such as Maersk and Sea-Land.

Mexico's port infrastructure upgrade program is nearly complete and the focus is shifted to improving the administrative, regulatory, and operational aspects of the port system.

A World-Wide Shipping survey indicates that shippers have a poor opinion of marine transportation compared to air, rail, and trucking.

In the Canada-Mexico trade, waterborne transportation hauls 17 percent of the overall trade.

1993



Sources: See Appendix B, p. 335 for a list of general literature reviewed.

wages and the increasing use of containers, which are more secure than break-bulk shipments. By 1992, carriers in all modes were becoming very interested in the rapidly developing US-Mexico trade. Another trend was also developing at that time. Transport companies of the same (and different) modes began joint-ventures to provide service to and from Mexico. This was done to more-effectively utilize assets, such as double-stack rail cars, flat cars, boxcars, barges, trucks, ro/ro ships, and container ships. Many joint-ventures were also formed with Mexican carriers in various modes to facilitate market access and improve intermodal connections. Seamless service marked the standard of efficiency that most carriers were striving for.

By December 1992, Mexico had opened major sectors of its national infrastructure to private investment, including the port system. The US-Mexico trade was becoming very dynamic and part of this growth was in response to ongoing negotiations over NAFTA. New efforts, in both the US and Mexico, were undertaken to improve efficiency at border crossings. More emphasis was also being placed on expanding intermodal operations, while Mexican Customs began to pre-clear certain rail shipments. Railroads were making tremendous gains at that time against trucking, in regard to container movements. This was due to the implementation of new rail technology, mainly in the US, and the increasing use of double-stack trains.

Mexican ports also made tremendous progress in 1992. They received about $126 million in improvements that year alone. There were even discussions about extending the US Intracoastal Waterway into Mexico and initiating new short-sea routes. Growth in the Mexican port system was most evident at the four major container ports of Veracruz, Altamira/Tampico, Manzanillo, and Lázaro Cárdenas. They changed to a 24-hour schedule, continued to upgrade their infrastructure, initiated a new port state control program, hired the Port of Singapore to provide operational training, and were able to increase container moves from 12 moves per ship per hour in 1988 to 32 moves per ship per hour in 1992. The goal was 50. Mexican ports were also trying to recapture some of the country's cargo being transshipped through US ports. An estimated 20 percent of Mexico's trans-Pacific containerized trade was moving through US ports at that time. Although Mexican container ports were clearly making progress by handling almost 450,000 TEUs in 1992, only 8.5 percent of all US-Mexico commerce moved by water that year.

In 1993, additional ocean carriers began service in the trade, although many were not direct, all-water operations. A few even began liner service between Canada and Mexico. Most of them, however, provided service to Mexico through Transportación Marítima Mexicana (TMM) slot-sharing arrangements, regular stack train shipments, double-stack rail services or intermodal trucking connections out of US

ports. Lykes Lines was the only major US carrier using its own vessels to serve the trade in 1993. Regardless, the trend towards joint-venture operations increased substantially that year, even with air carriers. Another situation developed that would later affect US-Mexico maritime transportation. Container hijackings were becoming a serious problem on Mexican highways. American President Lines, for example, had many of its marine containers hijacked while being transshipped south by truck from the Port of Los Angeles. These containers usually carried high-value cargo from Asia. Thus, hijackings would generate new interest in the much safer all-water option during the coming year.

Several configurations, other than typical ocean-liner operations, were also tried in the 1993 US-Mexico trade. Burlington Northern Railroad, for example, initiated a US-Mexico rail/barge service because it did not have a direct rail link to Mexico at that time. CSX Railroad was also investigating the potential of a similar rail-car/trailer-on-barge operation. Other roll-on/roll-off services using ships and barges were initiated, as well, to bypass growing border congestion.

President Salinas passed major legislation in the summer of 1993 that drastically changed Mexico's port system. All ports were to be turned over to private, semi-autonomous port administrations. These decentralized administrations were

open to 100 percent private investment, but foreign interests were allowed only a 49 percent share by law. Thus, nationalism was still affecting Mexico's ability to improve its economy. Aside from this persistent problem, the new port administrations were going to be responsible for administering the ports, overseeing port operations and development projects, and granting port service and operations concessions to private bidders. The latter were open to 100 percent foreign investment. This was encouraging for major ocean carriers, such as Sea-Land and APL, that were highly-skilled at operating their own marine terminals. Regardless, it was clear that Mexico wanted to attract enough foreign investment to actually improve port productivity while maintaining some form of domestic control over the system in the process. By August 1993, about 25 private port concessions had been awarded, primarily at bulk terminals. The very first semi-autonomous port administration was installed at the fishing port of Puerto Madero. By the end of the year, over 60 private concessions had been awarded, which also included new dredging projects. Mexico's extensive port upgrade program was nearly completed by the end of the year.

The US-Mexico market was extremely active in 1993. A great deal of attention was being focused on new intermodal connections, toll road construction, expanding ocean-liner operations, port upgrades and privatization, and new double-

stack train services. The trade had reached a new level of sophistication that year. Many inter-carrier negotiations were taking place and new types of intermodal equipment, such as AutoStack container racks and tank containers, were now being used in the trade. Mexico also became a member of the International Standards Organization (ISO), while US Customs installed a multi-million dollar electronic customs clearance system. NAFTA was signed and ratified in the US, Canada, and Mexico that year, as well. Air cargo operations were rapidly expanding and new intermodal terminals were being constructed in the major industrial regions of Monterrey and Guadalajara.

North-south trades were gaining in popularity over sluggish east-west routes as container flows rapidly expanded in Latin America. This development signified a major change in historical trade patterns. In Mexico, petroleum made up 75 percent of all cargo passing through its ports during 1993. Nevertheless, Mexican container ports handled over 460,000 TEUs that year, which accounted for 16 percent of all cargo handled by the port system. This number has been steadily growing since the late-1980s. General cargo tonnage through Mexican ports actually increased at an average annual rate of 12 percent during the early-1990s, with eight Mexican ports handling significant to substantial numbers of containers during 1993.

Competition was becoming very intense in the trade by the end of 1993. Several carriers in various modes failed

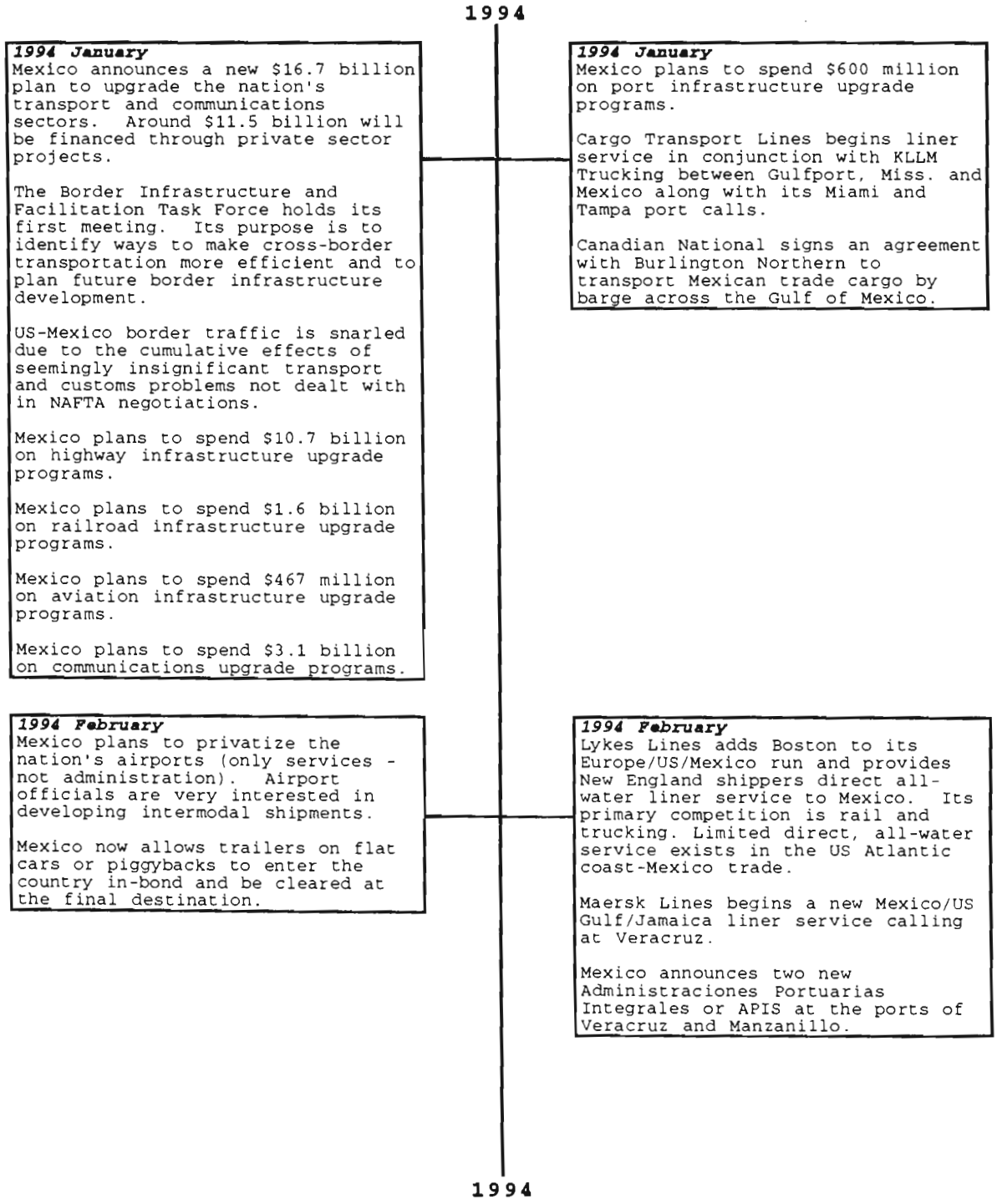
for different reasons. A 1993 World-Wide Shipping survey indicated that most shippers had a poor opinion of ocean transportation, compared to the other three modes. This suggested that waterborne carriers were going to have a much harder time gaining market share than expected. Also, many shipper/carrier (i.e. trucking and rail) relationships were quite entrenched after years of development. Even though there was a tremendous amount of cargo flowing in the trade, ocean transportation's major task was finding a way to capture it from the land and air sectors. Mexican Gulf Line, for example, targeted high-growth commodities moving in large amounts on a trade-wide basis during 1993. This service, however, failed by the end of the year due to insufficient volumes. This case reflected the extremely competitive nature of the US-Mexico market, as well as the tremendous influence of lack of shipper recognition.

Epoch Three (1994-2008)

Epoch Three was analyzed next and comprised the years 1994 to 2008 on a variable time scale. See Figure 7. In 1994, Mexico announced another $16.7 billion program to upgrade its transportation and communications infrastructure. Almost 70 percent of this was to be financed through private investors, as well. About $600 million of this was destined for port improvement and privatization projects. NAFTA also went into effect that year and generated even greater cargo

FIGURE 7

SECONDARY DUAL TIME LINE CONTINUUM (1994-2008)
(EPOCH THREE - BY DATE AND EVENT)



1994 March
The largest US customs broker association urges US Customs to hire more inspectors and trade specialists to handle increasing traffic at the US-Mexico border.

APL plans to develop intermodal operations within Mexico in conjunction with Transportacion Maritima Mexicana and Ferrocarriles Nacionales de Mexico. Double-stack train service from Mexican ports to Mexico City and Guadalajara is the next priority.

APL complains once again about cargo theft in Mexico after having 60 containers and trailers hijacked over the last two years. This is mainly high-value cargo from Asia such as televisions.

1994 March
Americas Marine Express, Inc. begins a new liner service between Memphis, Guatemala, and Progreso, Mexico. This is the first operation to utilize the US Maritime Administration study "Maritime System Of The Americas" concepts and recommendations.

Mexico approves the ocean transport of US apples to the Port of Manzanillo. Dole Ocean Liner Express will handle the truck/ocean intermodal moves.

Mexico considers a new law to streamline cargo inspections at the nation's ports to prevent delays from too many permit and approval requirements.

The Port of Saint John, New Brunswick investigates all-water liner service to Mexico. Forest products are the cargo of focus.

Sea-Land Service announces a new liner service to the Mexican ports of Manzanillo, Veracruz, and Altamira to develop intermodal moves within Mexico instead of intermodal moves to Mexico from US ports. The service includes a Maersk slot-sharing agreement.

Because over 80 percent of Canada's trade with Mexico now moves over land, the impact of NAFTA on Canada-Mexico marine transportation will be minimal.

Mexico announces it will phase out auto incentives for shippers using Mexican ocean carriers and will bring its fleet up to standards in order to join the Organization of Economic Cooperation and Development (OECD).

1994 April
Cargo Transport Lines begins a new liner service between Miami, Progreso, and Veracruz.

A two-week old Teamsters Union strike in the US delays Sea-Land's first ever direct calls to the Mexican port of Manzanillo.

US, Mexico, and Canada sign a maritime agreement primarily designed as a framework for sharing information.

1994 May
Mexican Customs allows Union Pacific and Ferrocarriles Nacionales de Mexico or FNM to haul trailers on flat cars (TOFC) in-bond to the Pantaco intermodal yard in Mexico City.

1994 May
Sea-Land Service is seeking Mexican port operations concessions with a Mexican partner in Veracruz, Altamira, Manzanillo, and Lazaro Cardenas.

APL and TMM begin a joint weekly, fixed-day, all-water container service between Asia and Mexican Pacific coast ports to avoid double customs entries from intermodal moves out of US ports.

TMM and APL offer 'door-to-door' liner service with their new Asia-North America joint-venture.

Maersk Line begins dedicated, fully containerized, liner service between Houston and Veracruz.

1994 July
Mexico begins electronic data transmission of customs information to Mexican customs brokers.

1994 July
Cargo Transport Lines temporarily halts its US-Mexico liner service to re-structure its management.

1994 September
Mexico completes its two-year process of decentralizing the state-controlled ports into semi-autonomous integral port administrations or APIS.

1994 October
Mexico opens its new intermodal rail facility in Monterrey.

Ferrocarriles Nacionales de Mexico, Mexico's state-run railway, continues to lose cargo to trucking, which provides better customer service and faster delivery times.

Mexico considers expropriating land along the US border to build new roads in an effort to alleviate congestion.

Burlington Air Express begins operating out of Mexico City and Guadalajara. Its major competitors are Emery Worldwide, United Parcel Service, Federal Express, Air Express International, and Panalpina.

1994 October
Burlington Northern terminates its US-Mexico rail/barge service citing an inability to lower costs and being unable to raise rates. It failed because the predominant cargo was grain, a low-value commodity that was unable to generate sufficient revenue.

CSX backs off from its plans to begin a rail/barge service between the US and Mexico.

A researcher at Louisiana State University says that small, roll-on/roll-off vessels called 'coasters' could effectively move containers and trailers between the US East and Gulf Coasts, Canada, and Mexico.

Cargo Transport Lines reinstates its US-Mexico liner service.

Delays in Mexican rules for port privatization frustrate potential investors and cause facility neglect at the ports as interested parties take a wait-and-see approach.

Carriers interested in the US-Mexico trade complain that new APIS administrators are the same people from the old federal port agency, Puertos Mexicanos, and have a hard time grasping the concept of competition.

1994

1994 October
Carriers are interested in operating highly profitable Mexican container terminals but APIS administrators are not obligated to grant these concessions. They may retain control even though the carrier could do a better job.

The prize Mexican container ports of Veracruz, Altamira/Tampico, Manzanillo, and Lazaro Cardenas have yet to be offered up for private operation.

1994 December
Latin America is still unable to independently finance its crucial transportation infrastructure and thus remains dependent on foreign investments.

Mexico has 69 transportation projects in the works requiring $13.6 billion in investments.

Shippers and carriers once again complain about armed cargo theft in Mexico and Guatemala. Joint lobbying efforts may be the only way to bring about change.

1994 December
The recent peso devaluation makes Mexican exports more desirable and TMM expects its trade between the US and Mexico to increase.

Dole cancels its Manzanillo port call due to time constraints in Ecuador leaving Washington apple growers without an all-water route to Mexico.

The Mexican steamship line, TMM, is relatively unhurt by the peso devaluation because its cash position is 100 percent in US dollars.

1994
The $375 million US Capital Improvement Program, designed to upgrade US-Mexico border infrastructure, nears completion.

US trucking firms are having a hard time finding backhaul cargo from Mexico because of difficulties in re-positioning equipment.

US railroads are having a difficult time finding backhaul cargo from Mexico because the north-south rail lines are not as developed as east-west lines. It is hard to re-position equipment for backhauls.

Burlington Air Express has air cargo service to 13 Mexican airports.

Union Pacific Railroad expands its 'BulkTainer' service (an intermodal tank container) throughout Mexico.

Cargo shipments into Mexico are still limited but container traffic is increasing.

Ferrocarriles Nacionales de Mexico is again considering upgrading the trans-isthmus rail link between Coatzacoalcos and Salina Cruz, Mexico to compete with the Panama Canal for intermodal traffic.

Downsizing and occasional rail equipment shortages keep some intermodal joint-ventures from being implemented in the US-Mexico trade.

1994
Mexico spends $30 million to liquidate union contracts at ten of the country's ports up for privatization in order to improve throughput efficiency.

Mexico has 73 ports of various size and function.

APL says it will phase out cross-country general cargo container movements to the US-Mexico border by replacing them with direct calls to Mexican ports. This will be done to improve efficiency and minimize the threat of cargo theft.

Transportacion Maritima Mexicana (TMM) is Mexico's largest integrated transport company.

The Mexican ports of Veracruz, Manzanillo, Lazaro Cardenas, Progreso, Puerto Madero, Tampico, Acapulco, Altamira, Guaymas, and Chetumal are taken over by semi-autonomous integral port administrations (APIS).

Steamship lines now emphasize shipping cargo to Mexico by all-water routes instead of using their intermodal connections. This signifies a major change in the way carriers view the Mexican port system which is now effectively functional.

1994

1994

1994

Intermodalism is the fastest growing sector of rail transportation. Shippers today demand consistent, zero-defect deliveries from transport companies.

Mexico's shipping companies are popular targets for foreign joint-ventures.

Rail is increasing its market share in the US-Mexico trade.

Canadian National Railway expects to haul over 30,000 containers in the Canada-Mexico trade by the end of the year.

APL expresses interest in marketing FNM unit trains and becoming more involved in port management operations in Mexico. This is a major shift in focus from its intermodal system in the US-Mexico trade.

Mexico opens its new intermodal rail facility in Guadalajara.

President Salinas states that FNM, Mexico's state-owned railway, is a disaster and there is no justification for keeping it under state control regardless of constitutional restrictions to the contrary.

Air cargo transport to Mexico is still hampered by a requirement that consolidated shipments be cleared through customs at the first point of entry before disbursement instead of permitting in-bond shipments.

Mexican cabotage laws still prohibit non-Mexican rail and truck lines from operating in Mexico.

One gallon of diesel fuel can move one ton of cargo 59 miles by truck, 202 miles by rail, and 514 miles by barge.

Mexico has 29,000 miles of federal highways. Only 15 percent are in excellent condition, 57 percent are in average condition, and 28 percent are in poor condition.

The Mexican government is planning to construct a 7,240 mile network of superhighways to link up the countries major ports with primary industrial and commercial centers. Over 1,000 miles of this network are now complete.

The 3 major US railroads doing business with Mexico are Union Pacific, Santa Fe, and Southern Pacific.

1994

The Mexican government will continue to own existing port infrastructure, water areas, and waterfront property but their use, development, and exploitation will be open to private concessions.

US-Mexico waterborne shuttle services experience difficulties competing with trucking and rail due to the latters' quicker delivery times to Mexico City, Guadalajara, and Monterrey. Finding northbound cargo is also a big problem.

Mexican port privatization (i.e. awarding of port concessions) gets bogged down when the semi-autonomous integral port administrations (APIS) cannot decide who should get the concessions.

Asia is the largest exporter to Mexico by ocean transport.

Mexico liquidates its centralized port authority, Puertos Mexicanos, and turns over administration of the country's ports to semi-autonomous port authorities or APIS administrations.

Mexico awards dozens of private marine terminal concessions for the first time ever.

Mexico has 18 deep-water commercial ports.

1995

1995 January
The Pantaco intermodal yard in Mexico City begins backing up.

US Customs begins the most sweeping change in its history to implement the 1993 Customs Modernization And Informed Compliance Act to handle increasing US commerce.

It is projected that Mexico will spend from $20 billion to $50 billion by the year 2010 on new roads, bridges, border crossings, ports, and other infrastructure projects.

Mexico finally amends Article 28 of its constitution to remove the state-owned railway, FNM, from the strategic national asset list. This will effectively permit private investment in the railroad although the level of privatization is still pending.

US railroads such as UP and SP are interested in Mexico's north-south rail lines while some steamship lines may be interested in east-west rail links from the Ports of Manzanillo or Veracruz to Mexico City.

The Mexican air carrier, Mexicana de Aviacion, is in severe financial trouble due the peso crisis, huge debts, increasing competition, and high operating costs.

The global airline industry begins coming out of a four-year slump.

The Mexican government approves a constitutional amendment to take FNM off the country's list of strategic industries. This will finally permit foreign investment in the inefficient railroad. US railroads and ocean-liners are interested in concessions.

1995 April
Mexico plans to begin constructing an intermodal rail link from the west coast port of Mazatlan into Mexico City to expedite container deliveries.

1995 December
Vehicle standards of NAFTA countries are to be compatible.

US and Canadian trucking companies will be allowed to invest in Mexican trucking firms for the first time.

1995 January
Shippers cancel orders due to the peso devaluation and cargo delays occur at Mexican ports as many consignees hold off accepting goods already shipped. This is tying up containers needed for outbound shipments.

Mexican shipping agents worry that steamship lines will eventually cut back service to Mexico due to the Mexican currency crisis and reduced demand by Mexican consumers.

Liner service in the US-Mexico trade is expected to be negatively affected by the peso devaluation. TMM, however, also expects its charter service in minerals and commodities to increase. TMM may also change its vessel rotations in the liner trade.

Mexico announces an accelerated program for privatizing port concessions at the country's four major container ports to raise $200 million urgently needed capital. Bidding rules for these concessions are due out in February 1995.

Sea-Land has the most frequent liner service to the Port of Manzanillo and is interested in bidding on concessions at the terminal.

APL, a major carrier serving Mexico, is interested in bidding on Mexican port concessions at the major container terminals.

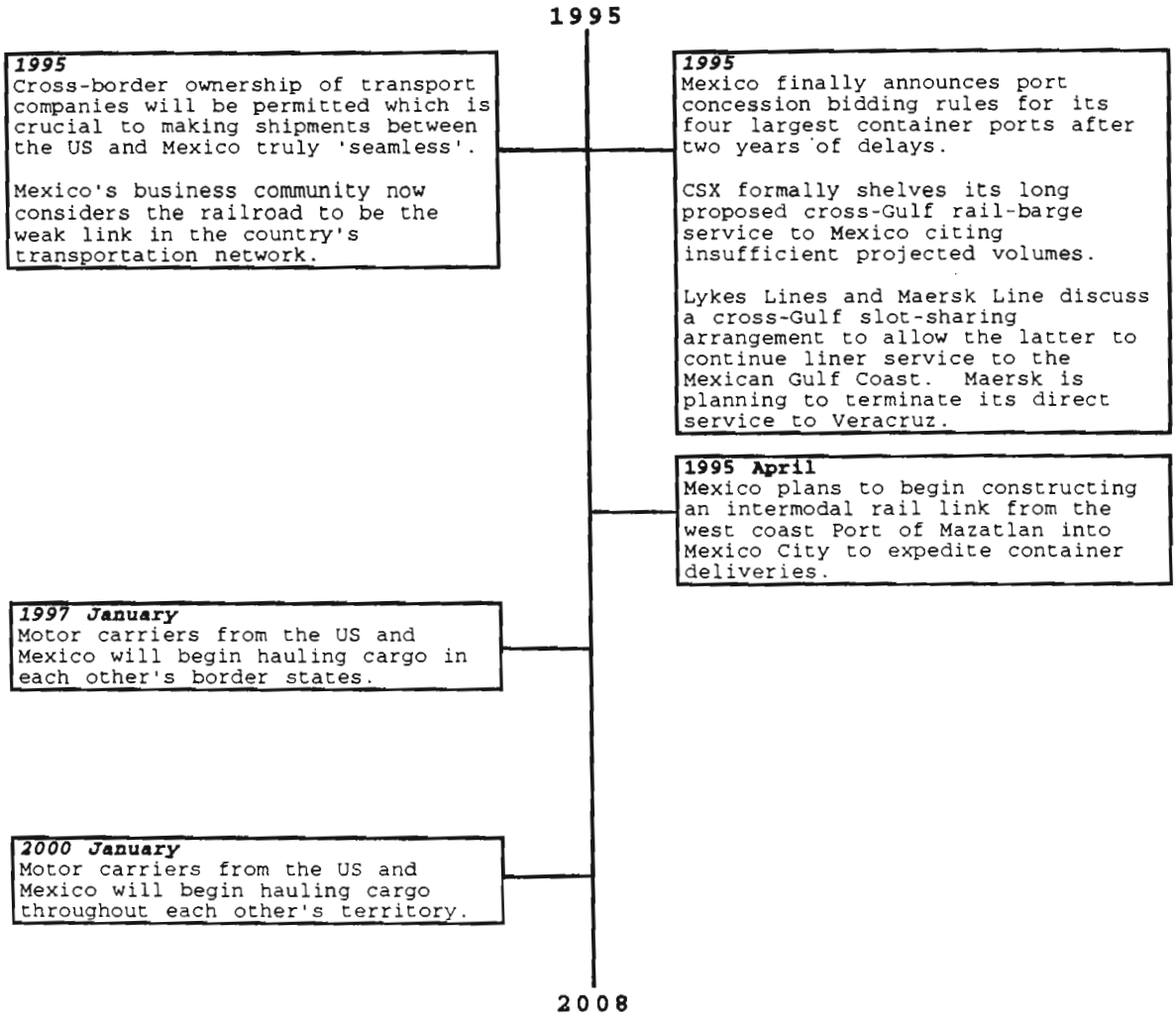
It is still unclear whether carriers calling at Mexican ports will be permitted to bid on terminal concessions.

1995 February
Marine terminal operators in Mexico set up a new association called Asociacion Nacional de Terminales Maritimas y Portuarias to have a collective voice in resolving legal, administrative, governmental, and operational issues. It will negotiate with APIS.

The Japanese firm, Tomen America Inc., signs a joint-venture agreement with Bunkers de Mexico to provide marine fuel to the Mexican Pacific Ports of Acapulco, Lazaro Cardenas, and Manzanillo under the latter firm's new port concession to supply bunkers.

Mexico has awarded over 120 private port concessions since 1993.

Ivaran Lines, Nacional Line, and Transportatcion Maritima Mexicana announce a new vessel sharing service between the US Gulf Coast, Mexico, and South America.



Sources: See Appendix B, p. 335 for a list of general literature reviewed.

flows. Traffic at the border became severely congested, which was made worse by US and Mexican Customs unfamiliarity with NAFTA implementation regulations.

The Mexican transport system underwent tremendous change in 1994. Its airports were targeted for privatization, as airport officials became more interested in intermodalism. Improvements in this sector turned US-Mexico air cargo services into a significant ocean transport competitor by 1994. Several air carriers expanded operations in the region, including Federal Express and United Parcel Service. Air cargo shipments, however, were still not allowed to move in-bond into Mexico, which negatively affected the mode's overall efficiency. Market conditions, however, were generally improving in all sectors. Mexican customs, for example, began to allow trailer-on-flat cars to pass in-bond into Mexico. Rail carriers had been seeking this for years. It would greatly improve efficiency in both the trucking and rail sectors, while relieving some of the pressure on border crossings.

New ocean transport services continued to develop in 1994. Intermodal cross-Gulf services were popular at that time and hauled containers, rail cars, and trailers to and from Mexico. Moreover, Lykes Lines began a new inter-line service linking Boston and Mexican ports to provide an all-water connection from the US Atlantic coast to Mexico. Canadian railroads even signed on to the new Burlington

Northern cross-Gulf rail/barge service to bypass congested border crossings. West coast fruit carriers found different kinds of backhauls that year after disrupting ocean freight rates since 1991. Dole Ocean Liner Express, for example, began transporting Washington apples and pears to Manzanillo after Mexico opened the port to US waterborne produce exports.

Another major change took place in the trade during 1994 when several large ocean carriers, following the earlier lead of Lykes Lines in 1992, began direct, all-water services to Mexico using their own vessels. Their Mexican ports of call were primarily inter-line on main-line routes. This expansion took place mainly because of improving productivity at Mexican container ports. Carriers were searching for new ways to avoid growing congestion at the US-Mexico border; a factor that continued to hinder Mexican container transshipments through US ports. These larger companies, including Maersk Line and Sea-Land, had finally recognized the trade as being viable for conventional container ship operations.

New private port administrations were installed at the major Mexican container ports of Manzanillo and Veracruz in early 1994. This signified a new phase in the development of Mexico's port system since infrastructure upgrades were largely completed by the end of 1993. The government was also trying to streamline cargo inspections at the ports to

minimize delays. Moreover, it spent $30 million that year to liquidate union contracts at the major ports to improve throughput efficiency. Mexico also signed a maritime information sharing agreement with the US and Canada. It phased out auto-shipping incentives for Mexican waterborne carriers, as well, so the country could join the Organization of Economic Cooperation and Development (OECD). This was another positive sign that Mexico was abandoning pre-1982 protectionist policies.

Ocean transportation grew rapidly in Mexico as major carriers implemented new door-to-door services and sought port operations concessions. They were particularly interested in concessions at the major container ports of Veracruz, Altamira/Tampico, Manzanillo, and Lázaro Cárdenas. Some of the smaller shuttle carriers, however, had trouble competing against the larger ocean operators, as well as other modes. This was, and continues to be, a serious problem in the trade's maritime transport sector. Ocean carriers of all sizes should be focusing on capturing cargo from land and air carriers instead of from each other. That way, the industry's overall standing will improve in the US-Mexico trade by generating greater shipper recognition and new business. Several other problems appeared in late 1994. Even though Mexico had largely converted all its ports into private port administrations by September, bidding rules on concessions had still not been instituted because the new

administrators could not decide who should get them. Their main concern was avoiding a recurrence of the past monopolies that had disrupted Mexico's port system for so many years. Many of these administrators were the same people from Puertos Mexicanos, the highly-centralized port agency that was liquidated after port privatization was completed in September 1994. Carriers and stevedores complained that they did not understand free market competition and were holding up progress.

At that time, most Latin American countries were unable to independently finance improvements in their transportation systems. They remained highly dependent on private and foreign investments. Thus, Mexico should have taken action much sooner to attract the investments it obviously needed to operate at international levels of efficiency. The influence of the old highly-centralized system was still prevalent in the recently decentralized port system, particularly since many of the new administrators were ex-Puertos Mexicanos bureaucrats. Burlington Northern's rail/barge system also failed in 1994 due to insufficient volumes. It was handling mainly low-valued cargo, such as grain, that did not generate sufficient revenue to keep the operation going. CSX put its much anticipated rail/barge project on hold, as well. It officially shelved the plan in 1995. On the west coast, Dole Ocean Liner Express canceled its backhaul shipments of Pacific Northwest produce to Manzanillo. This move, however,

was merely due to scheduling problems in Ecuador and it left a void in the market.

Aside from these problems, general cargo flows were still improving in the trade and major upgrades continued to take place in Mexico's transportation industry. The country opened new intermodal yards, for example, in the major industrial regions of Monterrey and Guadalajara during 1994. Intermodalism was now receiving great attention from all modes. The US government also neared completion of the $375 million Capital Improvement Program to upgrade its border infrastructure. New types of containers, such as intermodal tank containers and AutoStack racks, were becoming more common in Mexico, as well. Intermodalism was rapidly expanding, largely because shippers now demanded fast, zero-defect service. Rail carriers, in particular, were gaining an increasing share of the US-Mexico container trade, while Canada-Mexico container flows grew rapidly. Although technologically advanced foreign rail carriers were serving both the US-Mexico and Canada-Mexico trades, the substandard Mexican railroad, FNM, continued to hinder progress. President Salinas said that FNM was a disaster and it should be taken off the list of strategic national industries.

The most significant development in the US-Mexico maritime transport sector occurred when major ocean carriers, particularly APL and Sea-Land, began to promote direct, all-water services over their well-established, land-based

intermodal connections out of US ports. This was done to improve efficiency and reduce container exposure to hijackers. The move signified a huge breakthrough for Mexican ports because major players now considered the country's port system to be effectively functional. Large carriers were interested in all-water services to and from Mexico, unit-train development, improving intermodal connections, bidding on port service and operations concessions, and increasing market share. Asia-Mexico all-water commerce was rapidly expanding at that time, as well. New joint-ventures, between foreign and Mexican ocean carriers, were implemented to meet the demand in this and other Mexican trades. Mexico's cabotage laws, however, still prohibited foreign trucking and railroads from operating in Mexico. Equipment and crew trade-offs were still required at the border, which greatly diminished efficiency and carrier control over hardware. Equipment repositioning was also a major problem in regard to locating backhaul cargoes. Even though intermodalism was the fastest growing sector in the US-Mexico trade during, it was still hindered by many deficiencies in the system.

In December 1994, the new Mexican president, Ernesto Zedillo, devalued the peso under mounting international economic pressures. It immediately decreased in value by nearly 40 percent and sent the Mexican economy into chaos. While this crisis drastically reduced southbound cargo flows,

at least in the short-term, some gains were made in northbound shipments. This shift would, at the very least, help mitigate problems most carriers were having finding backhaul cargo. Regardless, Mexican intermodal yards, ports, and US-Mexico border crossings began backing up with containers as shippers and consignees cancelled orders or delayed receipt of goods. This led to container shortages and many shipping agents feared that ocean carriers would pull their ships out of the trade. The foreign trade situation was quickly deteriorating in Mexico by the end of 1994.

The Mexican government tried to raise urgently needed capital, under a $14 billion emergency privatization plan, in an effort to slow the tremendous outflow of foreign capital. President Zedillo passed a constitutional amendment in early 1995, as part of this emergency plan, that effectively removed FNM from Mexico's list of strategic national industries. Such a move would allow privatization of the railroad to raise capital and concurrently bring much needed improvement to the system; a decision that should have realistically been made years ago. FNM was the weak link in the Mexican transport network in 1995. The peso crisis, however, will most-likely benefit this railroad over the long-run. It would probably not have been privatized without the economic turmoil and any other improvements, under state control, would most-likely have taken years to implement.

The move to open FNM to private and foreign investors generated great interest from US and Canadian railroads. They had been promoting this kind action for years. It also caught the attention of several ocean carriers, such as TMM, APL and Sea-Land. They were interested in improving their already established north-south intermodal links, as well as investing in new ones between the increasingly more efficient Mexican ports and interior industrial regions. The primary goal was to augment their new, all-water services to Mexico with more efficient east-west intermodal connections within the country.

The emergency privatization plan also called for opening airports and power generation to private investors. More important to ocean commerce, this plan accelerated the release of bidding rules for major container port concessions. They were finally released in February 1995 after nearly two years of delays. Ocean carriers would be allowed to operate a marine terminal, even when their ships were calling at the same port. Only one port per coast, however, was allowed to each firm in order to prevent a recurrence of past monopolies. Even though short-term cargo flows were badly damaged by the peso crisis, ocean carriers finally had a clear path for long-term development in the Mexican transportation system. They could now bid on both port and rail concessions, which would give them a much greater level of control over their container transport

operations. Many carriers decided to position themselves for post-crisis growth, even if it meant taking a loss in the short-term. This indicated that carriers still believed the US-Mexico trade had tremendous potential and it was experiencing only a temporary setback. Mexico still planned to spend anywhere from $20 billion to $50 billion by 2010 on transport system upgrades. Moreover, vehicle standards in all NAFTA countries were scheduled to be uniform by the end of 1995, which would greatly improve intermodal efficiency.

President Clinton put together a $50 billion multilateral financial aid package to help Mexico in February 1995, while the latter adopted extensive austerity measures in March of that year. Even though cargo flows continued to suffer, particularly in the southbound trade, new joint-ventures still formed in the US-Mexico maritime transport sector encompassing everything from dredging to bunker fuel services. A new marine terminal operator association was even formed in 1995 to give port concession winners a collective voice in dealing with private port administrations and the Mexican government. The latter still had substantial control in this sector because it would continue to own existing port infrastructure, water areas, and waterfront property. Regardless, almost 120 private port concessions had been awarded between 1993 and 1995 and more were forthcoming. Moreover, a new intermodal link was scheduled for construction from Mazatlán to Mexico City to expedite

container shipments. Containerized transportation in the US-Mexico trade was clearly undergoing tremendous expansion by 1995.

Between 1995 and 2000, the trucking sector will receive additional benefits as the North American trucking industry is further deregulated under NAFTA. By 2008, all goods moving in the US-Mexico trade will be tariff-free, provided they meet NAFTA country-of-origin requirements. By then, a far more efficient and technologically advanced transport system is likely to be in place to handle US-Mexico commerce.

Secondary Dual Time Line Continuum: Summary

In summary, nationalistic articles in the 1917 Mexican constitution hampered the development of a healthy port system from early on. They restricted foreign investment and prohibited the private ownership of waterfront property and port infrastructure. Mexico subordinated the importance of maritime transportation to other modes in its drive to integrate the country after the revolution. This continued until at least the 1970s and still occurs to a lesser degree in 1995. In the 1930s, Mexico adopted import substitution, which is a protectionist economic policy. It also continued to reject new technologies that were gaining favor on a world-wide basis, such as containerization. This led to the development of an inferior maritime system that left Mexico unable to effectively compete in global commerce. The

country's import substitution policy, however, did succeed in reducing its exposure to world-wide economic pressures between the 1940s and the 1960s.

Mexico began to expand its manufacturing sector in the 1960s, particularly with the new maquiladora program. Even though ocean-liners could not compete for maquiladora cargo, this initial development subsequently led to additional manufacturing in other parts of the country. At that time, however, trucking continued to dominate the US-Mexico trade. Highways and rail lines were extended in the north to accommodate the maquiladora trade and increasing US exports in capital goods that were essential to Mexican manufacturing. Maritime transportation had only a secondary role, however, particularly in regard to general cargo. Mexico also adopted several Latin American liner policies that reflected the highly-centralized and isolationist governments of the region; countries that were developing independently of each other. They were basically self-serving policies that led to even greater inefficiencies in regional maritime transportation. Intermodalism and just-in-time deliveries were introduced to the world during the 1960s, as well. Mexico, however, continued to reject them along with containerization. This undermined the country's entire transport network.

In the early-1970s, Mexico began to improve its transportation system under an expansionary fiscal policy

that included external borrowing and increasing petroleum revenues. Mexico's coastal shipping was rapidly improving and the government decided to upgrade this part of its maritime industry. The government took several different measures to improve the port infrastructure and the administrative aspects of coastal shipping. Mexico also improved its tanker terminals when petroleum became the primary source of revenue for the country. Mexico failed, however, to adopt containerization at a time when it had the fiscal resources and momentum to do so. This turned out to be a long-term setback for waterborne commerce in the US-Mexico trade. Most developed countries had already accepted containerized transport, as the primary means of shipping liner cargo, by 1970.

Most of Mexico's shipping tonnage consisted of oil tankers during the 1970s, which reflected the country's dependence on petroleum revenue during that period. Trucking, however, still handled the majority of international general cargo shipments. Manufacturing was far less important to Mexico during the 1970s, particularly after huge oil deposits were discovered. Ocean-liner operations, which heavily depended on general cargo, were thus subordinated to the liquid bulk trade. Mexican port operations reflected this disparity, as well, even though coastal shipping continued to increase. Most of Mexico's waterborne commerce, however, still comprised bulk cargoes.

During the mid-1970s, Mexico finally began to significantly invest in container handling equipment. Most developed countries had already adopted containerization and were now extensively using land-bridge systems, which limited the number of ports called. Just because Mexico had some container facilities did not guarantee that vessel traffic would increase. Container transport operations were becoming highly specialized by 1977. Mexico was way behind in this respect and new developments made it even more difficult to catch up. The problem was compounded when large inflows of petroleum revenues led to widespread corruption in Mexico. Crime and corruption now plagued the Mexican port system, which hindered productivity even further. PEMEX also had great influence over port development projects due to its tremendous ability to generate revenue. The needs of general cargo facilities were generally subordinated to PEMEX, particularly on the Gulf coast.

The international oil market crashed in the early-1980s and Mexico was unable to make payments on its huge foreign debt when global interest rates climbed. President de la Madrid was forced to take drastic austerity measures to turn the economy around. Thus, most infrastructure upgrade projects, including seaports, were put on hold throughout the 1980s. President de la Madrid, however, began to liberalize trade and improve the Mexican manufacturing industry. This generated the type of cargo that ocean-liners needed to

survive. Much of this cargo, however, consisted of maquiladora goods and ocean transportation could not compete for it. Regardless, manufacturing grew so rapidly in Mexico that it ultimately replaced the troubled petroleum industry as the country's most important economic sector. Even though this led to some improvement in throughput at the marginally functional Mexican container ports, they remained corrupt and inefficient. This continued to discourage shippers and major ocean carriers from using them.

The cessation of Mexican port upgrades also came at a time when major deregulation was taking place in the US transportation industry. Competition was becoming intense and new technologies, such as double-stack train services were widely adopted. Intermodalism was expanding and it was just a matter of time before it was extended south to handle the increasing US-Mexico trade. Maritime transportation was dealt another setback when shippers and even large ocean carriers found a new way to avoid the corrupt and inefficient Mexican waterfront. They began using overland intermodal transshipments out of US container ports, such as Houston and Los Angeles/Long Beach, to move general cargo into Mexico. Motor carriers and railroads were able to further develop their relationships with shippers in the process. Land border crossings grew dramatically between 1984 and 1994 to handle the increasing cargo flows. Intermodalism was changing the nature of US-Mexico commerce and trucking firms

were well positioned to take advantage of it. Most Mexican highways ran in a north-south direction and connected major industrial regions. East-west intermodal connections out of Mexican ports, though, were poorly developed at that time.

US-Mexico cargo flows were rapidly increasing during the late-1980s, largely because of President de la Madrid's successful austerity program. Mexican manufacturing was expanding and traffic even began to pick up at Mexican container ports, which were still corrupt and inefficient. New technologies like intermodal tank containers were being introduced in the US during the mid- to late-1980s, which allowed shippers of non-conventional cargoes to capitalize on the benefits of containerization. These new containers would eventually be used in the US-Mexico trade, as well. There were also many cross-traders operating in the US and Canadian markets that would probably consider additional services to Mexico once conditions improved.

Major changes began to occur in 1988 after President Salinas took office. He initiated a drive to convert Mexico into an export-oriented country. This required a major overhaul of the country's entire transport system so that it could more effectively engage in global commerce. He also continued the trend towards trade liberalization started by President de la Madrid in the early-1980s. The Mexican government deregulated trucking in 1989, which provided carriers in all modes with additional intermodal connections

within the country. President Salinas also began to sign more foreign trade agreements, including one with the US to promote air cargo operations. Moreover, many miles of new toll roads were constructed at that time, which further enhanced the trucking sector.

In 1989, President Salinas initiated a $400 million upgrade program to improve productivity and efficiency within the Mexican port system. He formed Puertos Mexicanos specifically to upgrade and decentralize all ports in the country. They had to operate at international levels of efficiency in order to recapture Mexican cargo being routed through US ports. Shipper interests were also paramount at that time because of intensifying competition in the global market. Inefficiencies at Mexican container ports would make any carrier using them look bad. Shippers did not care about in-line problems. They just wanted their cargo delivered on time, at a reasonable rate, and in good condition. Double-stack intermodal services into Mexico were introduced in 1990. This development, as well as the increasing use of US container ports for Mexican transshipment cargo, solidified shipper/carrier (i.e. trucking and rail) relationships even further. In the meantime, US-Mexico maritime transportation was still trying to catch up. Cargo flows in the trade were rapidly expanding and even the best ocean carriers were unable to economically provide all-water services without more efficient Mexican container ports.

President Salinas knew that more drastic action was needed to improve productivity at Mexican ports. Physical upgrades by themselves were not enough. In 1991, he had the Mexican army seize the Port of Veracruz to break the grip of powerful and corrupt labor unions that had controlled it for many years. This was a major turning point for the Mexican port system. These unions were disbanded and forced to reorganize as private companies if they wanted to compete for new port concessions. Progress continued in the Mexican port upgrade program and several new ports opened that year. Also, efficiency and productivity in Veracruz began to rapidly improve within a month. Many foreign investors began to show great interest in bidding on new port concessions. Ocean carriers were also assessing the growing prospects in the US-Mexico general cargo trade and several lines initiated new services that year.

In 1991, President Salinas publicly acknowledged the great importance of a healthy port system to effective competition in global commerce. He also focused on developing non-petroleum exports to expand the Mexican economy, which was encouraging for ocean-liners. Once the powerful labor unions had been ousted from Mexican ports, container throughput quickly began to rise. It reached 375,000 TEUs in 1991, compared to less than 100,000 TEUs in 1984. Overall Mexican container traffic was up 6.1 percent that year. New intermodal operations in the Mexican

interior, however, intensified the competition for container traffic among all modes. Regardless, major port infrastructure improvements were well underway by the end of 1991 and productivity at Mexican container ports was finally improving.

The future was looking much better for US-Mexico waterborne transportation in 1991. Negotiations were also taking place on a North American Free Trade Agreement that year. A different problem, however, arose during the summer of 1991. Fruit carriers, providing dedicated produce service from Latin America to the US, began to seek backhaul cargo as common-carriers on otherwise empty return voyages. This led to overcapacity and reduced freight rates. It was another setback for maritime transportation because the extra competition hindered other carriers from entering the trade. Regardless, substantial progress was being made to overcome other problems facing the US-Mexico ocean transport sector.

Mexican President Salinas initiated a $14 billion program to upgrade Mexico's transportation infrastructure in 1992. Even though most of this consisted of private investments, foreign investors were still limited to a 49 percent share. This continued to hinder the true potential Mexico's transportation system. Regardless, upgrades previously implemented were showing strong results by 1992. Crime was way down and productivity and efficiency were dramatically improving at Mexican container ports,

particularly in Veracruz. New efficiencies in the Mexican port system and increasing cargo flows continued to attract new market entrants in the trade's marine transport sector. A major trend developing at that time was the use of joint-ventures and slot-sharing agreements among all modes, which used various equipment configurations. They did so to more-effectively utilize assets and to gain new intermodal connections, particularly with Mexican carriers who were much more familiar with their domestic market.

Intermodalism was becoming crucial to the US-Mexico trade. President Salinas saw this and allocated resources to improve Mexican intermodal connections, including the construction of new intermodal rail yards in major industrial regions. Advanced rail technologies were providing US and Canadian railroads with new opportunities in the trade, as well. Inefficiencies in the Mexican railroad, however, were a major impediment to the development of North America's rail system. Regardless, double-stack trains were common in Mexico by the end of 1992 and were capturing substantial amounts of containerized cargo from trucking. Rail-hauled bulk commodities, however, continued to decline in the trade. Other developments included new electronic customs clearance programs and other pre-clearance procedures at border crossings. They were designed to relieve severe border congestion, which was expected to worsen after NAFTA went into effect. Ocean carriers were still involved in cross-

border intermodal shipments to the extent of Mexican container transshipments through US ports.

By 1992, Mexican ports were making tremendous progress and were seeking to recapture the country's transshipment cargo from US ports. Container throughput reached almost 450,000 TEUs that year. Mexican ports were now on a 24-hour schedule to improve service, as well. Infrastructure upgrades and port operations training programs were proceeding relatively smoothly at that time. Many ocean carriers began to seriously consider new operations in the US-Mexico trade due to growing cargo flows and greater efficiency at Mexican container ports. Several smaller ocean carriers, and even a few larger ones, initiated direct, all-water service in the trade. Most carriers, however, provided service through slot-sharing arrangements on Transportación Marítima Mexicana (TMM) container ships, double-stack train service, regular stack trains, and/or intermodal trucking connections out of US ports. This indicated that even though all-water traffic was picking up, many ocean carriers were still wary of Mexican ports and their east-west intermodal connections. These carriers preferred to transship Mexican cargo through US ports and utilize trucking and stack train services to get their containers into Mexico, at least for the time being. Container hijackings, however, were becoming a major problem on Mexican highways. This would compel several ocean carriers to switch to all-water routes in 1994.

New rail/barge and other roll-on/roll-off services were initiated in 1993. Railroads without direct access to Mexico, such as Burlington Northern at that time and CSX, were particularly interested in the rail/barge services. Trucking firms were interested in various roll-on/roll-off configurations as a way to bypass growing border congestion. Mexican ports underwent a major change in 1993 when President Salinas passed legislation to convert all ports, which were still highly centralized under Puertos Mexicanos, into private, semi-autonomous port administrations. The new owners were going to be responsible for port administration, port development projects, and awarding private port service and operations concessions. The government, however, would retain ownership of all waterfront land, water areas, and existing infrastructure. The new port administrations were only open to 49 percent foreign investment. Port concessions, however, were open to 100 percent foreign ownership. Even though nationalistic restrictions continued to limit the true potential of Mexico's port system, many private concessions were awarded during 1993. Actually, Mexico's port infrastructure program was largely completed by the end of that year. Additional improvements in productivity would probably be more institutional in nature, at least until new port operations concessions could be awarded.

The US-Mexico market was extremely active in 1993. Major upgrades were underway in all sectors of the Mexican transportation industry. Many inter-carrier negotiations were taking place and new technologies were being introduced to the trade, which reached new levels of sophistication that year. NAFTA was also signed in 1993. This agreement was almost certain to generate even greater cargo flows once it went into effect on January 1, 1994. A major shift took place in shipping patterns at that time. North-south trades were attracting the interest of many carriers in all modes that had primarily been operating in sluggish east-west trades. Container flows to Latin America were rapidly increasing as regional trade liberalization proceeded. At least eight of Mexico's ports were now handling significant to substantial numbers of containers and throughput reached over 460,000 TEUs in 1993. General cargo flows were rapidly increasing at Mexican container ports mainly because of the economic policies and international trade agreements adopted by Presidents Salinas and de la Madrid.

By the end of 1993, competition for containerized cargo was very intense among all modes, even though many intermodal joint-ventures had been formed. While an increasing number of ocean carriers were serving the trade in one way or another, some of them failed. Mexican Gulf Line was such a company. Tremendous amounts of cargo moved between the US and Mexico in 1993, but capturing market share from the other

modes was proving to be very difficult. A 1993 World-Wide Shipping poll indicated that most shippers considered ocean transportation to be inferior to the other three modes. Regardless of the accuracy of shipper opinions, it was becoming clear that ocean carriers needed to implement aggressive marketing strategies to overcome entrenched shipper/carrier (i.e. trucking and rail) relationships, some of which dated back many years. This was, and still is, the biggest obstacle facing maritime transportation in the US-Mexico trade. Ocean carriers need to convince shippers that they can provide better service, faster or comparable transit times, and cheaper rates than the other modes. This substantial lack of shipper recognition is reflected by the fact that only 8.5 percent of all US-Mexico commerce moved by water in 1993. Nevertheless, conditions were generally improving during the early-1990s and the trade had good potential for ocean carriers interested in market entry.

The US-Mexico trade was very dynamic in 1994, as well. NAFTA had just gone into effect and commerce was expanding even faster. Severe border congestion resulted, partly because of US and Mexican Customs unfamiliarity with NAFTA implementation regulations. Mexico announced another infrastructure upgrade program, at a cost of $16.7 billion, to continue improving the country's communications and transportation systems. Most of this, however, was to be financed by private investors. Aside from this, all modes of

transport were experiencing substantial growth and improvements in operational efficiencies. Mexican Customs, for example, made concessions regarding trailer-on-flat car services that finally allowed in-bond rail shipments to ease border congestion.

The ocean transport sector was undergoing major changes in 1994, as well. Intermodal cross-Gulf services were becoming common. They hauled containers, trailers, and rail cars. Major ocean carriers were also implementing or expanding all-water, inter-line services with their own vessels on main-line routes. Most of them previously used slot-sharing agreements with Transportación Marítima Mexicana and/or overland intermodal transshipments out of US ports to serve the market. This changeover took place primarily because of rapidly increasing cargo flows under NAFTA, improving productivity at Mexican container ports, hijackings on Mexican highways, and a desire to bypass severe border congestion.

This year marked another important turning point in the US-Mexico maritime transport sector. Major ocean-liner operators, including Sea-Land, Maersk Line, American President Lines, and Lykes Lines, finally recognized the trade as being viable for conventional container ship operations. Some of the smaller ocean carriers, however, were having a hard time competing against these larger operators and other modes of transport. This reflected a

major problem in the maritime transport sector. Ocean carriers of all sizes were capturing cargo from each other when they should have been focusing on taking market share away from the land and air transport sectors. Doing it the second way would enhance the maritime transport industry's overall standing in the US-Mexico trade.

Conditions at Mexican container ports continued to improve during 1994. New private port administrations were installed throughout this system once port infrastructure upgrades were largely completed by the end of 1993. Mexico privatized its last port in September 1994, which left the issue of private port concessions to be resolved. The highly-centralized Mexican port authority, Puertos Mexicanos, was subsequently liquidated after fulfilling its objectives to privatize Mexican port administrations and upgrade port infrastructure. Mexico was also becoming more involved in the international maritime community during 1994.

Ocean carriers were mainly interested in bidding on marine terminal concessions at the primary Mexican container ports of Veracruz, Altamira/Tampico, Manzanillo, and Lázaro Cárdenas. Bidding rules, however, had not been instituted by the end of 1994 after nearly two years of delays. Private port administration officials could not decide who should get the concessions. Their major concern was preventing a recurrence of past monopolies. Thus, most investors adopted a wait-and-see policy before investing more resources into

the system, which led to equipment neglect at several Mexican ports. These events occurred at a time when most Latin American countries were still unable to independently finance improvements in their transportation systems. Mexico was no exception. It should have take action much sooner to secure the private and foreign investments that were obviously needed to get the Mexican port system operating at international levels of efficiency. Centralist attitudes towards competition were clearly still hindering progress in the Mexican transport system because many of the new port administrators were ex-Puertos Mexicanos bureaucrats. Several ocean-liner services were cancelled or delayed at that time primarily because of more endogenous-type forces, such as inadequate marketing or operational problems.

Other changes took place in the US-Mexico trade during 1994, as well. All modes serving the market focused greater attention on developing their intermodal connections. Moreover, new types of containers entered the trade, while many intermodal and transport infrastructure projects were close to completion. US and Canadian railroads, as well as major air cargo firms, made substantial progress in the market. Rail carriers, in particular, captured an increasing number of containers from trucking with new stack train and double-stack services. Moreover, unit-trains were recognized as being far more secure than individual container shipments on truck chassis, which were being hijacked at an increasing

rate on Mexican highways. The Mexican national railroad, however, was the biggest impediment to developing the North American rail system. Private and foreign investors were still prohibited from operating FNM by the Mexican Constitution, even though such investments were clearly needed to improve the inefficient and substandard railway. President Salinas himself said FNM was a disaster and should be privatized. Regardless, no further action was taken on the matter during 1994.

The most significant development in 1994 US-Mexico waterborne commerce occurred when major liner companies, specifically American President Lines and Sea-Land Service, began to promote direct, all-water services over their well-established overland intermodal connections out of US ports. They did so to take advantage of the increasingly more efficient Mexican port system and to minimize container exposure to hijackers on Mexico's highways. This was a huge breakthrough for Mexican ports because major players finally considered them to be effectively functional. Sea-Land, APL, and even TMM were also interested in unit-train development (for added security on east-west routes out of Mexican ports), improved intermodal connections, bidding on port service and operations concessions, and increasing their market share. Other Mexican waterborne trades, including Asian commerce, were also rapidly developing at that time.

New joint-ventures continued to form in all aspects of the US-Mexico trade, while intermodalism rapidly expanded. Regardless, systematic deficiencies continued to hinder intermodal transportation from reaching its true potential. In December 1994, a sharp devaluation of the peso set off an economic crisis in Mexico. Previously strong southbound cargo flows were disrupted and the transportation industry was left trying to decide how to handle the situation. Most carriers, however, came to the conclusion that it would only be a temporary setback. The majority of carriers opted to maintain operations, in one way or another, until Mexico's economy stabilized. The North American Free Trade Agreement would incrementally help the Mexican economy to recover, as well.

The peso crisis forced the Mexican government to devise a $14 billion emergency privatization plan to raise urgently needed capital. This plan had major implications for the entire US-Mexico transportation network. President Zedillo secured a constitutional amendment that removed the national railroad, FNM, from Mexico's list of strategic industries. This railway was crucial to the trade's intermodal system, but remained in terrible condition. Privatization would allow foreign and private investors to bring much needed improvements to the railroad, while generating capital for the state. Privatizing FNM would ultimately improve overall US-Mexico intermodal operations in the long-run. The Mexican

government also accelerated the release of bidding rules for private marine terminal concessions under the plan. They were finally published in February 1995 and major ocean carriers still expressed interest in port concessions, despite the excessive delays. Airport services and power generation were also included in the new privatization plan.

Thus, ocean carriers finally had a logical course of operational expansion in the US-Mexico trade by early 1995, despite recent cargo flow disruptions. Many carriers were predominantly looking to position themselves for the post-crisis trade. They now had the opportunity to bid on both marine terminal and railroad concessions. This would give carriers more operational control over their new, all-water services to and from Mexico. Their priorities were to increase productivity at Mexican marine terminals and to develop east-west intermodal rail links between the ports and the interior industrial regions. Containerization and intermodalism were the fastest growing sectors of the trade by 1995. Most carriers believed that cargo flows would pick up again once the peso crisis had passed, especially with NAFTA available to facilitate a recovery.

In early 1995, President Clinton put together a $50 billion multilateral financial aid package for Mexico and the latter subsequently adopted extensive austerity measures to get its economy back on track. New joint-ventures continued to form in the trade's maritime transportation sector and

Mexico still planned to spend billions of dollars on transport system upgrades by 2010. Other NAFTA-generated benefits, such as uniform vehicle standards and a further deregulation of the North American trucking industry, were due in the near future, as well. By 2008, all NAFTA-qualifying goods moving in the US-Mexico trade are scheduled to be tariff-free. A more efficient transportation system will most-likely be in place by then to handle cargo flows. At any rate, the US-Mexico trade finally has good, long-term potential for the maritime transportation industry.

CHAPTER FIVE

IMPORT ANALYSIS

Shift-Share Output: Imports

US Department Of Commerce general cargo import statistics were processed using the shift-share model. The results were analyzed and interpreted in further detail to draw valid conclusions about cargo capture trends in the US-Mexico trade. Emphasis was placed on conventional ocean-liner operations throughout this chapter. Twenty-foot equivalent units or TEUs were used in the import analysis to reflect equivalent weight characteristics, i.e. one TEU equals approximately ten metric tons. The usage of TEUs did not represent, nor intend to represent, the actual number of marine containers moving north in the US-Mexico trade.

The fact that ocean transportation handled only 8.5 percent of total US-Mexico commerce by value in 1993 means that ocean carriers are interested in almost any commodity amenable to containerized transport (US Department Of Commerce, 1993b and author's calculations). Regardless, maritime industry decision-makers must rationalize limited resources by targeting US-Mexico trade commodities having the best potential for long-term growth and capture by ocean transport. For this reason, and to make the study more

manageable, only the import commodities appearing on the top-twenty 1993 Vessel Weight, top-twenty Total Weight Shift-All Modes, and top-twenty 1993 Vessel Value lists (with an emphasis weight characteristics) were chosen for further study.

These categories were selected because they were likely to contain the high-growth commodities most attractive for capture by ocean transportation. See Appendix K, p. 391 for all import commodities on each list. This study did not disaggregate maquiladora industry commerce from the overall trade. Although ocean transportation cannot effectively compete for this cargo, due to the concentration of in-bond plants along the US border, carriers should follow developments in this sector.

> Mexico's government would like to decentralize the concentration of maquiladora facilities which at present are 92 percent concentrated in border states and bring more jobs to interior points (Selwitz, 1991, p. 16).

This is encouraging for ocean carriers because they would be able to compete more-effectively for this cargo once the industry expanded south. The dispersion of maquiladora operations, however, will probably not be realized for quite some time.

Regardless, the results of the import analysis can be used by the maritime transport sector in several ways. They reveal a choice of high-growth commodities from which carriers could formulate long-term marketing campaigns,

strategic-growth policies, newbuilding programs or development plans at liner-operated marine terminals.

Aggregate Import Analysis

The shift-share import results were aggregated by weight and value to determine the overall status of maritime transportation in the US-Mexico general cargo trade. See Table 1. In 1989, ocean transportation had a seven percent market share, by weight, hauling approximately 58,120 TEUs of general cargo. This share was superior to that of air transportation, which had a 1989 market share of less than one percent and consisted of 450 TEUs. Ocean transportation's performance was quite weak, however, compared to land transportation's almost 93 percent market share in 1989. This share comprised almost 825,000 TEUs. Ocean transport's market share improved slightly by 1993 to eight percent, at an average growth rate [(terminal year - initial year)/initial year] of 43 percent for the period. This comprised almost 83,000 TEUs of general cargo and was larger than air transport's small (less than one percent), but rapidly increasing share by weight (almost 1,900 TEUs) during 1993. Ocean and air transportation, however, were both dwarfed by land transport's 92 percent market share that year, which consisted of over 945,000 TEUs. The overall general cargo import trade, in TEUs, grew by an average rate of 17 percent between 1989 and 1993.

TABLE 1

MODAL MARKET SHARE OF ALL IMPORT COMMODITIES EXCELLENT OR SUITABLE FOR CONTAINERIZED TRANSPORT IN THE US-MEXICO TRADE

US IMPORTS BY WEIGHT

TRANSPORT MODE	1989 TOT WEIGHT *(TEUs)*	1989 MKT SHR *(By Mode)*	1993 TOT WEIGHT *(TEUs)*	1993 MKT SHR *(By Mode)*
OCEAN	58,120	7%	82,838	8%
AIR	450	<1%	1,838	<1%
LAND	824,899	93%	945,501	92%
TOTAL	883,469		1,030,177	

US IMPORTS BY VALUE

TRANSPORT MODE	1989 TOT VALUE *($)*	1989 MKT SHR *(By Mode)*	1993 TOT VALUE *($)*	1993 MKT SHR *(By Mode)*
OCEAN	218,300,000	1%	285,464,000	1%
AIR	204,700,000	1%	764,801,000	3%
LAND	18,118,200,000	98%	26,708,087,800	96%
TOTAL	18,541,200,000		27,758,352,800	

TEU = Weight In Twenty-foot Equivalent Units (approx. 10 metric tons)
$ = Value In US Dollars
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

Note: Total Trade Maximum Rounding Error Is 22 TEUs (due to conversion from metric tons).

Sources: US Department of Commerce (1989 and 1993b) and author's calculations

When ocean transportation's performance was analyzed by value, the results were even worse. Weight characteristics, however, are still more crucial to waterborne commerce. Ocean transportation handled over $218 million of general cargo in 1989, which was slightly higher than air cargo's approximately $205 million value. Ocean transport's market share was roughly equal to that of air transportation at one percent. Land transportation handled over $18 billion in general cargo during 1989, which was a 98 percent share of the market. In 1993, ocean transport maintained its one percent market share with a slightly higher total value of over $285 million. Air transportation, however, experienced tremendous growth between 1989 and 1993. Its market share grew to three percent in 1993 and was worth almost $765 million. This was over three times air transport's 1989 value and over 2.5 times the value of 1993 total waterborne import commerce. Air transportation thus made solid progress over the period in higher-valued cargo, the mainstay of its operations. Land transportation also experienced strong growth over the period, but lost some market share to the air and ocean transport sectors. It handled a tremendous $26.7 billion in general cargo during 1993 and had a slight decrease in market share to 96 percent. The overall general cargo import trade, in US Dollars, grew by an average rate of 50 percent between 1989 and 1993.

The figures shown in Table 1, p. 208 indicate that ocean transportation was handling predominantly heavier, lower-valued general cargo between 1989 and 1993. Marine transportation did show some improvement during the period, however, particularly by weight. This was probably gained at the expense of land transportation, which lost a percentage point of market share in TEUs over the period. The slight overall improvement by ocean transportation also indicates that the true impact of Mexico's port upgrade program is only beginning to be realized. Tremendous growth experienced by land transportation, however, indicates that shippers still have strong ties with trucking and rail, in regard to US-Mexico general cargo. Air transportation is making substantial progress in higher-valued cargo, which is far more important to the mode than weight. This portion of the study sought to reveal the status of waterborne general cargo imports in the US-Mexico trade between 1989 and 1993. The next section identified high-growth commodities amenable to capture by ocean-liner companies.

In-Depth Import Analysis

Three base output tables, comprised of relevant shift-share import statistics, were created from the raw data. This was done to permit a detailed analysis of the trade's general cargo flows. These tables included only the top-twenty 1993 Vessel Weight, top-twenty Total Weight Shift-All

Modes, and remainder top-twenty 1993 Vessel Value import commodities to make the study manageable and to isolate the most promising commodities. The purpose of this section was to provide ocean transport managers with a concise list of optimal liner cargoes that are amenable to capture by waterborne containerized transportation. These three base output tables were further expanded into accompanying cross-reference tables to facilitate a more comprehensive analysis of relevant commodities. Each base output table was analyzed separately throughout the remainder of this chapter.

Import Analysis By 1993 Vessel Weight

The first section of the detailed shift-share analysis assessed, by weight in TEUs, the top-twenty 1993 import commodities hauled by ocean transportation. See Tables 2 and 3. This was done to reveal those commodities with strong, long-term growth characteristics and good potential for capture by maritime transportation. Only import commodities moving in trade-wide volumes of at least 6,000 TEUs (or 500 TEUs per month) during 1993 were analyzed further. Overall cargo flows of at least 500 TEUs per month, by commodity, were designated as the low-end cutoff point for the larger lots market. Commodities moving in lots smaller than this, on a trade-wide basis, would be "...difficult to match up with conventional vessels" (US Department Of Transportation, 1993b, pp. 7-8). Many waterborne containers currently moving

TABLE 2

SHIFT-SHARE BASE OUTPUT: IMPORTS
(LISTED BY 1993 VESSEL WEIGHT)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
522	39,960	41,719	4%	*OCEAN*	6,635	-21,046	16,170	-4,876
				AIR	0	0	0	0
				LAND	30,692	-97,346	-16,170	-113,515
				ALL				-118,391
057	750	25,207	3261%	*OCEAN*	125	27	24,306	24,332
				AIR	0	0	8	8
				LAND	19,935	4,265	-24,313	-20,048
				ALL				4,292
679	3,740	4,479	20%	*OCEAN*	621	-933	1,052	118
				AIR	0	0	0	0
				LAND	2,020	-3,036	-1,052	-4,087
				ALL				-3,969
112	500	3,056	511%	*OCEAN*	83	796	1,677	2,473
				AIR	0	0	2	2
				LAND	3,426	32,841	-1,678	31,163
				ALL				33,638
071	4,210	1,778	-58%	*OCEAN*	699	-2,320	-810	-3,131
				AIR	0	0	0	0
				LAND	4,376	-14,523	810	-13,713
				ALL				-16,844
523	820	1,680	105%	*OCEAN*	136	344	380	724
				AIR	0	0	0	0
				LAND	2,113	5,337	-380	4,958
				ALL				5,682
072	290	1,209	317%	*OCEAN*	48	691	180	871
				AIR	0	0	0	0
				LAND	18	252	-180	72
				ALL				943
657	1,410	888	-37%	*OCEAN*	234	180	-935	-756
				AIR	0	0	6	6
				LAND	244	187	930	1,117
				ALL				367
676	2,700	289	-89%	*OCEAN*	448	-1,549	-1,310	-2,859
				AIR	0	0	0	0
				LAND	745	-2,576	1,310	-1,266
				ALL				-4,125
516	250	268	7%	*OCEAN*	42	529	-552	-24
				AIR	0	0	0	1
				LAND	193	2,461	552	3,013
				ALL				2,990

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
112	ALCOHOLIC BEVERAGES
071	COFFEE AND COFFEE SUBSTITUTES
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
072	COCOA
657	SPECIAL YARNS, SPECIAL TEXTILE FABRICS, ETC.
676	IRON & STEEL BARS, RODS, ANGLES, SHAPES & SECTIONS
516	ORGANIC CHEMICALS, NES

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 2
(CONTINUED)

SHIFT-SHARE BASE OUTPUT: IMPORTS
(LISTED BY 1993 VESSEL WEIGHT)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
892	90	209	132%	*OCEAN*	15	369	-265	104
				AIR	2	41	-14	27
				LAND	111	2,756	279	3,035
				ALL				3,166
574	0	206	NEW	*OCEAN*	0	36	171	206
				AIR	0	0	0	0
				LAND	1	1,744	-171	1,574
				ALL				1,780
664	20	160	700%	*OCEAN*	3	22	115	137
				AIR	0	0	2	2
				LAND	2,082	13,608	-118	13,490
				ALL				13,629
022	0	107	NEW	*OCEAN*	0	107	0	107
				AIR	0	0	0	0
				LAND	0	3	0	3
				ALL				110
778	10	90	800%	*OCEAN*	2	155	-77	78
				AIR	0	2	23	25
				LAND	700	65,445	53	65,499
				ALL				65,602
121	70	84	20%	*OCEAN*	12	12	-11	2
				AIR	0	0	0	0
				LAND	39	42	10	52
				ALL				54
034	1,190	70	-94%	*OCEAN*	198	-994	-323	-1,318
				AIR	13	-67	390	323
				LAND	392	-1,971	-66	-2,037
				ALL				-3,032
582	0	60	NEW	*OCEAN*	0	0	60	60
				AIR	0	0	3	3
				LAND	0	3,569	-63	3,506
				ALL				3,569
048	10	59	490%	*OCEAN*	2	5	42	47
				AIR	0	0	0	0
				LAND	410	1,314	-42	1,272
				ALL				1,319
011	0	56	NEW	*OCEAN*	0	0	56	56
				AIR	0	0	0	0
				LAND	0	132	-56	75
				ALL				131

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
892	PRINTED MATTER
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
664	GLASS
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
778	ELECTRICAL MACHINERY AND APPARATUS, NES
121	TOBACCO, UNMANUFACTURED, TOBACCO REFUSE
034	FISH, FRESH (LIVE OR DEAD), CHILLED OR FROZEN
582	PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
048	CEREAL PREPS & PREPS OF FLOUR OR STARCH OF FRTS OR VEGS
011	MEAT OF BOVINE ANIMALS, FRESH, CHILLED OR FROZEN

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 3

KEY ATTRIBUTES OF TOP-TWENTY 1993 VESSEL WEIGHT IMPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
*522	224,794	18%	143,729	29%	69%	50%	26,700,000	35,527,000	33%
*057	120,804	1%	145,155	17%	1%	30%	1,400,000	69,977,000	4898%
*679	15,903	24%	14,575	31%	6%	5%	23,000,000	21,840,000	-5%
*112	21,133	2%	58,279	5%	1%	4%	4,900,000	14,134,000	188%
*071	30,562	14%	18,793	9%	7%	2%	69,000,000	23,777,000	-66%
*523	13,544	6%	21,474	8%	1%	2%	2,900,000	4,484,000	55%
*072	396	73%	1,404	86%	<1%	1%	9,600,000	12,969,000	35%
*657	2,878	49%	3,723	24%	2%	1%	12,100,000	10,558,000	-13%
676	7,188	38%	4,257	7%	5%	<1%	7,700,000	1,019,000	-87%
516	1,414	18%	4,639	6%	<1%	<1%	2,900,000	1,044,000	-64%

$ = US Dollars

% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)

** = Top-Twenty 1993 Vessel Value And Top-Twenty 1993 Vessel Weight Commodity*

SITC	COMMODITY LIST
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
112	ALCOHOLIC BEVERAGES
071	COFFEE AND COFFEE SUBSTITUTES
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
072	COCOA
657	SPECIAL YARNS, SPECIAL TEXTILE FABRICS, ETC.
676	IRON & STEEL BARS, RODS, ANGLES, SHAPES & SECTIONS
516	ORGANIC CHEMICALS, NES

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 3
(CONTINUED)

KEY ATTRIBUTES OF TOP-TWENTY 1993 VESSEL WEIGHT IMPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
*892	771	12%	4,066	5%	<1%	<1%	2,400,000	2,596,000	8%
*574	5	<1%	1,786	12%	<1%	<1%	100,000	2,301,000	2201%
664	12,560	<1%	28,275	1%	<1%	<1%	200,000	860,000	330%
022	0	N/A	110	97%	N/A	<1%	0	766,000	NEW
778	4,227	<1%	70,531	<1%	<1%	<1%	1,700,000	1,236,000	-27%
*121	304	23%	409	21%	<1%	<1%	3,800,000	4,600,000	21%
034	3,628	33%	1,199	6%	2%	<1%	10,800,000	1,405,000	-87%
582	0	N/A	3,569	2%	N/A	<1%	0	908,000	NEW
048	2,480	<1%	4,211	1%	<1%	<1%	100,000	797,000	697%
011	0	N/A	132	42%	N/A	<1%	0	1,341,000	NEW

$ = US Dollars

% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)

** = Top-Twenty 1993 Vessel Value And Top-Twenty 1993 Vessel Weight Commodity*

SITC	COMMODITY LIST
892	PRINTED MATTER
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
664	GLASS
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
778	ELECTRICAL MACHINERY AND APPARATUS, NES
121	TOBACCO, UNMANUFACTURED, TOBACCO REFUSE
034	FISH, FRESH (LIVE OR DEAD), CHILLED OR FROZEN
582	PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
048	CEREAL PREPS & PREPS OF FLOUR OR STARCH OF FRTS OR VEGS
011	MEAT OF BOVINE ANIMALS, FRESH, CHILLED OR FROZEN

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

in the US-Mexico trade are stuffed with either international transshipment or bilateral cargoes hauled on an inter-line basis. In other words, these containers are carried by conventional vessels making intermediate Mexican port calls on either larger main routes or on a wayport basis. Lykes Lines and Sea-Land Service, for example have Mexican inter-line itineraries. See Appendix E, p. 338. Larger container ships, however, may not be able to effectively compete in the small lots trade because of their dependency on scale economies for efficient operation. Small lot shipments would probably move more economically on either smaller, multi-purpose vessels with cargo capacities of around 250 TEUs or by barge as deck cargo (Sansbury, 1994b, p. 1B; and US Department Of Transportation, 1993b, pp. 7-8). US-Mexico waterborne commerce is still quite limited, except for major bulk commodities like petroleum. Many general cargoes in the trade are still in an early stage of development and would move more efficiently on smaller, non-container type vessels. "...[T]rade requirements and not technological possibilities determine vessel economies of scale..." (United Nations, 1989, p. 29). NAFTA, however, will most-likely expedite growth in these commodities to the point that they can ultimately be moved by larger ships. This study focused on higher-volume commodities that can be more readily captured by larger, conventional ocean-liner vessels.

The following commodities were excluded from the remainder of the study due to insufficient 1993 cargo flows (i.e. less than 500 TEUs per month): SITCs 072, 657, 676, 516, 892, 574, 022, 121, 034, 582, 048 and 011. See Table 3, p. 214. The remaining commodities were analyzed in this section according to the shift-share logic described in the methodology. See Shift-Share Scenarios, p. 69. This was done to reveal fast-growth cargoes amenable to capture by ocean transportation. See United Nations (1986) for a five-digit subdivision of all commodities included in the three-digit analysis. A positive proportionality shift indicates that a commodity is growing faster than the trade-wide average for all import cargoes included in the study; a negative one indicates declining or slower-than-average growth. A positive differential shift indicates cargo capture by a mode; a negative one indicates cargo loss by a mode. Thus, inverse differential shift signs reflect competition. This study focused on ocean transportation trade share, proportionality, and differential shift factors unless otherwise noted.

The first commodity, SITC 522 (Inorganic Chemical Elements, Oxides, Halogen Salts), has a negative proportionality shift, but a positive differential shift. It is declining trade-wide, as evidenced by its negative total shift of over 118,000 TEUs. Nevertheless, ocean transportation captured over 16,000 TEUs from land transport

between 1989 and 1993 and had an average growth rate of four percent over the period. Ocean transport handled almost 42,000 TEUs of SITC 522 in 1993, which were worth over $35.5 million. It accounted for 50 percent of all waterborne general cargo imports that year. Ocean carriers may want to develop short-term policies to try and capture the remainder of this cargo, which moved north in an absolute amount of almost 144,000 TEUs during 1993, to maximize any remaining benefits. "The peso devaluation is expected to boost some Mexican chemical exports" (Hall and Johnson, 1995, p. 8A). Since this commodity makes up a large share of total northbound waterborne commerce, it should be considered as an alternative target on a short-term basis. Some of this cargo can also be moved by intermodal tank containers, which comprise a "...small, but growing, part of the U.S. chemical transportation industry" (Gottschalk, 1994, p. 5C). SITC 522 is also one of the 1993 top-twenty ocean transport import commodities by value in the trade. Regardless, the most desirable cargoes are fast-growing on a trade-wide basis.

SITC 057 (Fruit, Nuts, (Not Including Oil Nuts) Fresh Or Dried) should definitely be pursued by ocean carriers due to its excellent long-term growth and cargo capture potential. Fresh fruit is also considered to be a principal Mexican export (Journal Of Commerce, 1993, p. 4A). Moreover, the Mexican Port of Manzanillo is now trying to position itself as a produce hub, with its refrigerated facilities

(DiBenedetto, 1994, p. 1A; and Brennan, 1994, n.p.). This very large commodity had an overall average growth rate of 20 percent between 1989 and 1993. It has positive proportionality and differential shifts. SITC 057 is fast-growing on a trade-wide basis and ocean transport captured over 24,000 TEUs from the land modes between 1989 and 1993. More than 25,000 TEUs of this commodity, worth almost $70 million, moved by water in 1993. This was up from only 750 TEUs moving on vessels in 1989 and accounted for 30 percent of ocean transport's total import commerce in 1993. Ocean carriers realized a 3,261 percent average growth rate by weight in this commodity between 1989 and 1993. Marine transportation's market share in SITC 057 was 17 percent during 1993 out of a total of more than 145,000 TEUs moving north in the overall trade. Thus, substantial amounts of this commodity are available for capture and carriers should adopt aggressive marketing policies to expand their market share. Also, "TMM [Transportación Marítima Mexicana] ...purchased a stake in the Del Monte Fresh Produce Co., and that may yield new increases in perishables traffic to the United States" (Hall, 1993c, p. 4C).

The Mexican Peso crisis should make this import commodity even more attractive to US consumers due to its lower cost. The fact that ocean transportation is doing rather well in SITC 057 indicates wider shipper recognition of the mode. Carriers should try to enhance this momentum

whenever possible. The literature review indicated that shipper recognition is one of the biggest obstacles facing ocean carriers in the US-Mexico trade. Regardless, shippers want good service and ocean transportation has the opportunity to develop new ways to help them get more of their harvest to market intact. Carriers should work with producers to overcome systematic inefficiencies, such as poor intermodal connections.

> The entire Mexican distribution system, from harvest to delivery in the United States, is so plagued by delays, warehouse and transportation inefficiencies and lack of refrigerated facilities, that 35% of Mexico's perishables spoil before they reach the intended markets (Mongelluzzo, 1994a, p. 2B).

SITC 057 is also one of the 1993 top-twenty ocean transport import commodities by value and one of the top-twenty total weight shift commodities, which indicates a high-growth cargo. Carriers, however, need to evaluate this commodity in further detail before making marketing decisions. Mexico's export market to the US in avocados, for example, is not a viable target at the present time. This fruit has been banned in the 48 contiguous US states for over 80 years because of pests. Many US producers of other fruits and vegetables, however, say this is just a disguised trade barrier and there is no problem with the fruit. The large Mexican avocado market could open up in the near future, however, under pressure from US plum, peach, nectarine, and other producers. They are being quarantined by Mexico as

indirect retaliation for the dispute. Regardless, avocados would be a good cargo to monitor as a future target for waterborne transportation. Most Mexican avocados come from the more southern State of Michoacan (producing 1.2 billion pounds in 1994) near the Ports of Manzanillo and Lázaro Cárdenas (Johns, 1995c, pp. 1A and 8A). The top 1993 Mexican fruit exports to the US in 1993 were actually bananas, grapes, melons, and other assorted produce (Hall, 1994f, p. 1A).

SITC 679 (Iron & Steel Tubes, Pipes & Hollow Profiles, Fittings) is a smaller to medium-size commodity with a negative proportionality shift, but a positive differential shift. Even though it is declining on a trade-wide basis, this commodity has some short-term potential for maritime transportation due to cargo capture. SITC 679 was hauled in significant quantities by ocean transportation in 1993. It moved almost 4,500 TEUs of this commodity, worth almost $22 million that year. Water transport captured over 1,000 TEUs of SITC 679 from land transportation between 1989 and 1993. The ocean transport sector actually experienced a 20 percent average growth rate in SITC 679 between 1989 and 1993. It had a 31 percent market share in 1993, which accounted for five percent of total waterborne imports that year. More than 14,500 TEUs of SITC 679 moved north in the overall US-Mexico trade during 1993. Thus, ocean carriers may want to pursue this commodity with short-term marketing policies to

capture any remaining market share. They should only do so, however, because it currently accounts for a significant share of water transport's import traffic.

> Mexican steel [which consists mainly of low-end products] is now favorably priced in the U.S. market [due to the peso crisis] and Mexican exports should surge, especially if the U.S. economic recovery continues. The U.S. market is absorbing anything that comes in. When Mexico's economy gets back on track, it will absorb more of its domestic steel production and begin importing more from the United States (Mongelluzzo, 1995, p. 3A).

Moreover, SITC 679 is one of ocean transportation's 1993 top-twenty import commodities by value in the US-Mexico trade. Waterborne transportation could also benefit in a different way from the steel trade. Load limits for trucks between the Mexican border and Brownsville, Texas have steel shippers in both countries supporting an extension of the US Intracoastal Waterway into Tamaulipas and Veracruz, Mexico to improve transportation efficiency (Brohl, 1993, p. 27). This would also facilitate waterborne shipments of many other commodities. Such an extension is unlikely to occur any time soon, however, due to opposition by environmental groups (Alm, 1993, p. 2B). Thus, SITC 679 is still a short-term potential commodity.

SITC 112 (Alcoholic Beverages) is a fast-growth commodity with excellent potential for capture by ocean transportation. It will become even more attractive due to the Mexican Peso crisis, which is making Mexican goods less-expensive in the global market. This commodity had an

overall average growth rate of 176 percent between 1989 and 1993. SITC 112 also has strong, positive proportionality and differential shifts. This commodity is rapidly expanding in the US-Mexico trade, as evidenced by its positive total shift of more than 33,500 TEUs. Ocean transportation moved over 3,000 TEUs of SITC 112 in 1993, which represented a 511 percent increase over the 500 TEUs it hauled in 1989. Over $14 million worth of this commodity moved by water in 1993, which accounted for four percent of ocean transport's northbound cargo flows that year. This mode captured over 1,600 TEUs of alcoholic beverages from land transportation between 1989 and 1993. Ocean transport also had a five percent share of the more than 58,000 TEUs of alcoholic beverages moving north overall during 1993. Again, maritime transportation has decent shipper recognition with SITC 112, which is hard to come by in the US-Mexico trade. Carriers should aggressively market their services to increase this momentum. Bulk shippers of this commodity have also expressed interest in moving some shipments by water in tank containers, while others prefer conventional marine containers for bottled products. Regardless, moving SITC 112 on vessels reduces cargo damage and improves transit times from the more southern points of origination (Telfer and Hall, 1994, p. 1A).

There are large amounts of SITC 112 available for capture and ocean carriers should actively pursue them

because of the commodity's strong, long-term growth potential. Beer out of Mexico City, for example, is the Southern Pacific Railroad's primary northbound containerized commodity (Selwitz, 1991, p. 15). Ocean carriers should take action to move in on this cargo. They should also consider service to the Mexican Port of Topolobampo, which handles major shipments of beer to California (Knee, 1993b, p. 56). Moreover, ocean carriers might be able to route empty marine containers, from Mexican port calls, through the new intermodal terminal in Monterrey. They could pick up beer there, as backhaul cargo, during repositioning. Monterrey has the largest brewing industry in Mexico (Hall, 1994o, p. 8A). Alcoholic Beverages are a 1993 top-twenty ocean transport import commodity by value, as well as a top-twenty total weight shift commodity, which indicates high-growth.

SITC 071 (Coffee And Coffee Substitutes) is a poor alternative for ocean transportation with its negative proportionality and differential shifts. The commodity is rapidly declining on a trade-wide basis due to exogenous factors. This is evidenced by its negative total shift of almost 17,000 TEUs. Moreover, ocean transportation lost more than 800 TEUs of SITC 071 to land modes between 1989 and 1993. Nevertheless, waterborne carriers moved about 1,800 TEUs of this commodity in 1993, which were worth roughly $24 million. This represented a nine percent market share for ocean transportation in 1993, out of the approximately 18,800

TEUs moving north in all modes that year. SITC 071 accounted for two percent of total northbound waterborne commerce in 1993, compared to a seven percent share in 1989. The commodity should not be pursued by ocean carriers, except perhaps to maintain present customers because of its continued substantial value and the significant number of TEUs still moving by water. It would be better to abandon this cargo under normal circumstances. Coffee, however, is still considered to be a principal Mexican export (Journal Of Commerce, 1993, p. 4A). It is also experiencing a shift "...from breakbulk to container traffic..." (Selwitz, 1993, p. 26). The Mexican Port of Salina Cruz, for example, is a significant coffee port that Mexican exporters utilize. The Ports of New Orleans and San Francisco are major coffee import centers in the US (Knee, 1994, n.p.). SITC 071 is also one of the 1993 top-twenty ocean transport commodities by value, despite its negative shift-share characteristics. Regardless, coffee is declining on a trade-wide basis and ocean transportation is losing market share. Carriers should focus their marketing resources on more promising long-term, high-growth cargoes.

SITC 523 (Metallic Salts And Peroxysalts Of Inorganic Acids) is a medium-size, fast-growth commodity with good, long-term cargo capture prospects for ocean transportation. This commodity had an overall average growth rate of 59 percent between 1989 and 1993 with positive proportionality

and differential shifts. It is rapidly growing on a trade-wide basis. "The peso devaluation is expected to boost some Mexican chemical exports" (Hall and Johnson, 1995, p. 8A). Ocean transport captured significant amounts of SITC 523, almost 400 TEUs between 1989 and 1993, from land transport modes. Maritime transportation hauled about 1,700 TEUs of this commodity in 1993, which represented a 105 percent increase over 1989 figures. SITC 523 accounted for two percent of total northbound US-Mexico waterborne commerce during 1993. Almost 21,500 TEUs of this commodity moved north in the overall trade that year. Water transport had an eight percent share in 1993 worth almost $4.5 million. This commodity has decent, long-term growth characteristics and should be pursued by ocean carriers. There is a significant amount of SITC 523 moving north in the trade, which is subject to capture by carriers with the most effective marketing policies. It has small, but improving, shipper recognition that should be further developed. This commodity is also a 1993 top-twenty ocean transport commodity by value and a top-twenty total weight shift cargo, which indicates high-growth.

SITC 664 (Glass) is a medium to larger-size, fast-growth commodity that provides ocean carriers with a good opportunity for market expansion. "The US is the world's largest market for flat glass, a material used primarily for glazing in the construction and automotive industries"

(Lautsch, 1993, p. 39). It has positive proportionality and differential shifts. This commodity is rapidly growing on a trade-wide basis, as evidenced by its positive total shift of over 13,600 TEUs. SITC 664 had an average growth rate of 125 percent between 1989 and 1993. Ocean transportation captured 115 TEUs of this commodity from the land modes over the same period. Even though only 160 TEUs of SITC 664 moved by water in 1993, this was a good improvement from the 20 TEUs hauled in 1989. It reflected a water transport average growth rate of 700 percent between 1989 and 1993. Regardless, ocean transportation had only a one percent market share of SITC 664 in 1993 worth $860,000. This commodity's share of total northbound waterborne commerce was negligible. Aside from this, over 28,000 TEUs of SITC 664 moved north in the overall trade during 1993. This is a significant amount of cargo, particularly since it is fast-growing. The Mexican Peso crisis is likely to cause the growth to accelerate, at least in the short-term. Thus, ocean transportation has a good opportunity to develop the glass import market, particularly from production regions farther south. SITC 664 is also on the 1993 top-twenty total weight shift list, which indicates it is a high-growth commodity. The major problem with this commodity is that it is currently moving in small amounts by water, which indicates a low level of shipper recognition. Ocean carriers may want to consider routing empty marine containers from Mexican ports of call through the new

intermodal terminal in Monterrey, which is relatively close to the US border. They could pick up glass manufactures there, as backhaul cargo, during repositioning. Monterrey has the largest glass industry in Mexico (Hall, 1994o, p. 8A).

SITC 778 (Electrical Machinery And Apparatus, NES) is a large, rapidly growing commodity. NES stands for not-elsewhere-specified. This growth is evidenced by the commodity's positive total shift of over 65,500 TEUs. It has a positive proportionality shift, but a negative differential shift. This cargo has long-term potential for ocean transportation. Both the air and land transport modes are capturing it from ocean transportation, which lost 77 TEUs between 1989 and 1993. Nevertheless, SITC 778 grew by an average rate of 1,569 percent between 1989 and 1993. There were over 70,500 TEUs of this commodity moving north in the US-Mexico trade during 1993. "Mexico is strong in ...light manufacturing sectors, notably electrical equipment" (Fraser, 1992, p. 88). Ocean transportation, however, had only a less than one percent share of the commodity's 1993 total import trade. This consisted of 90 TEUs, which were worth over $1.2 million. SITC 778 accounted for only less than one percent of northbound waterborne cargo flows that year. Ocean carriers should try to stop the cargo loss by aggressively marketing their services to SITC 778 shippers. This is a rapidly growing commodity, which primarily consists

of higher-valued goods. This high-growth is evidenced by its classification as a top-twenty total weight shift commodity. Shipper recognition of ocean transport services, however, is very low in SITC 778 and will require substantial attention by carriers. Liner operators should only pursue segments of this commodity not moving in the maquiladora trade. Ocean transportation cannot effectively compete in this market until it is dispersed farther south, which could take many years.

Import Analysis By Total Weight Shift

This portion of the detailed shift-share analysis assessed the top-twenty import commodities having the highest total weight shifts. See Tables 4 and 5. This was done to reveal commodities with strong, long-term growth characteristics and good potential for capture by maritime transportation. Again, several of these import commodities were hauled in trade-wide amounts of less than 6,000 TEUs (or 500 TEUs per month) during 1993, which was the imposed cutoff figure. They are listed below and were excluded from further consideration due to insufficient volumes that year: SITCs 873, 898, 884, 764, 776, and 059. See Table 5. Five of the remaining commodities on Table 4 were already analyzed, in the preceding section, as 1993 top-twenty vessel weight cargoes. See Table 3, p. 214. These commodities are noted below and were excluded from further discussion, in this

TABLE 4

SHIFT-SHARE BASE OUTPUT: IMPORTS
(LISTED BY TOTAL WEIGHT SHIFT-ALL MODES)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
778	10	90	800%	*OCEAN*	2	155	-77	78
				AIR	0	2	23	25
				LAND	700	65,445	53	65,499
				ALL				65,602
112	500	3,056	511%	*OCEAN*	83	796	1,677	2,473
				AIR	0	0	2	2
				LAND	3,426	32,841	-1,678	31,163
				ALL				33,638
716	0	0	N/A	*OCEAN*	0	8	-8	0
				AIR	0	8	6	14
				LAND	52	24,365	1	24,367
				ALL				24,381
054	10	50	400%	*OCEAN*	2	4	35	39
				AIR	5	11	3	14
				LAND	11,218	24,290	-38	24,252
				ALL				24,305
771	0	7	NEW	*OCEAN*	0	6	1	7
				AIR	0	6	6	12
				LAND	60	21,685	-7	21,678
				ALL				21,697
761	0	16	NEW	*OCEAN*	0	6	11	16
				AIR	2	554	-565	-12
				LAND	47	15,716	555	16,270
				ALL				16,274
664	20	160	700%	*OCEAN*	3	22	115	137
				AIR	0	0	2	2
				LAND	2,082	13,608	-118	13,490
				ALL				13,629
697	50	6	-88%	*OCEAN*	8	438	-490	-52
				AIR	0	1	21	22
				LAND	225	11,859	469	12,328
				ALL				12,298
248	40	50	25%	*OCEAN*	7	61	-58	4
				AIR	0	0	0	0
				LAND	1,069	9,898	58	9,956
				ALL				9,960
741	0	22	NEW	*OCEAN*	0	0	22	22
				AIR	0	0	1	1
				LAND	0	8,204	-23	8,181
				ALL				8,204

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
778	ELECTRICAL MACHINERY AND APPARATUS, NES
112	ALCOHOLIC BEVERAGES
716	ROTATING ELECTRIC PLANT AND PARTS THEREOF, NES
054	VEGS FRSH, CHLD, FROZ, ROOTS, TUBERS ETC. FRESH, DRIED
771	ELECTRIC POWER MACHINERY, AND PARTS THEREOF
761	TELEVISION RECEIVERS
664	GLASS
697	HOUSEHOLD EQUIPMENT OF BASE METAL, NES
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
741	HEATING & COOLING EQUIPMENT AND PTS THEREOF

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 4
(CONTINUED)

SHIFT-SHARE BASE OUTPUT: IMPORTS
(LISTED BY TOTAL WEIGHT SHIFT-ALL MODES)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
813	0	1	NEW	*OCEAN*	0	8	-7	1
				AIR	0	0	1	1
				LAND	14	6,648	6	6,654
				ALL				6,656
872	0	0	N/A	*OCEAN*	0	3	-3	0
				AIR	0	3	6	9
				LAND	33	5,840	-3	5,837
				ALL				5,846
523	820	1,680	105%	*OCEAN*	136	344	380	724
				AIR	0	0	0	0
				LAND	2,113	5,337	-380	4,958
				ALL				5,682
873	0	8	NEW	*OCEAN*	0	0	8	8
				AIR	0	0	4	4
				LAND	0	5,632	-11	5,621
				ALL				5,633
898	0	7	NEW	*OCEAN*	0	0	7	7
				AIR	2	5,044	-5,025	19
				LAND	0	50	5,018	5,068
				ALL				5,094
884	0	0	N/A	*OCEAN*	0	0	0	0
				AIR	0	2,481	-2,480	0
				LAND	0	2,481	2,480	4,961
				ALL				4,961
764	0	1	NEW	*OCEAN*	0	0	1	1
				AIR	0	2,244	-2,208	37
				LAND	0	2,244	2,207	4,451
				ALL				4,489
776	0	1	NEW	*OCEAN*	0	1	-1	0
				AIR	2	101	-83	18
				LAND	70	4,292	83	4,376
				ALL				4,394
057	750	25,207	3261%	*OCEAN*	125	27	24,306	24,332
				AIR	0	0	8	8
				LAND	19,935	4,265	-24,313	-20,048
				ALL				4,292
059	0	14	NEW	*OCEAN*	0	0	14	14
				AIR	0	0	1	1
				LAND	0	3,618	-15	3,603
				ALL				3,618

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
813	LIGHTING FIXTURES AND FITTINGS NES
872	INST & APPLIANCES, NES, FOR MED, SURG, DENT, OR VET PURP
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
873	METERS AND COUNTERS, NES
898	MUSICAL INSTRUMENTS AND PARTS, RECORDS, TAPES ETC.
884	OPTICAL GOODS, NES
764	TELECOMMUNICATIONS EQUIPMENT, NES & PTS, NES
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
059	FRUIT/VEG JUICES UNFERMENTED NOT INCL ADDED SPIRIT

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 5

KEY ATTRIBUTES OF TOP-TWENTY TOTAL WEIGHT SHIFT-ALL MODES IMPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC *(TEUs)*	1989 VSL MARKET SHARE	1993 TOTWT BY SITC *(TEUs)*	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC *($)*	1993 VSLVAL BY SITC *($)*	VESSEL VALUE CHANGE
778	4,227	<1%	70,531	<1%	<1%	<1%	1,700,000	1,236,000	*-27%*
*112	21,133	2%	58,279	5%	1%	4%	4,900,000	14,134,000	*188%*
716	311	<1%	24,743	<1%	<1%	<1%	100,000	9,000	*-91%*
054	67,600	<1%	103,129	<1%	<1%	<1%	100,000	460,000	*360%*
771	359	<1%	22,115	<1%	<1%	<1%	100,000	217,000	*117%*
*761	294	<1%	16,618	<1%	<1%	<1%	300,000	1,551,000	*417%*
664	12,560	<1%	28,275	1%	<1%	<1%	200,000	860,000	*330%*
697	1,405	4%	13,936	<1%	<1%	<1%	1,100,000	96,000	*-91%*
248	6,480	1%	17,516	<1%	<1%	<1%	600,000	530,000	*-12%*
741	0	N/A	8,204	<1%	N/A	<1%	0	859,000	*NEW*

$ = US Dollars

% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)

** = Top-Twenty 1993 Vessel Value And Top-Twenty Total Weight Shift Commodity*

SITC	*COMMODITY LIST*
778	ELECTRICAL MACHINERY AND APPARATUS, NES
112	ALCOHOLIC BEVERAGES
716	ROTATING ELECTRIC PLANT AND PARTS THEREOF, NES
054	VEGS FRSH, CHLD, FROZ, ROOTS, TUBERS ETC. FRESH, DRIED
771	ELECTRIC POWER MACHINERY, AND PARTS THEREOF
761	TELEVISION RECEIVERS
664	GLASS
697	HOUSEHOLD EQUIPMENT OF BASE METAL, NES
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
741	HEATING & COOLING EQUIPMENT AND PTS THEREOF

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 5
(CONTINUED)

KEY ATTRIBUTES OF TOP-TWENTY TOTAL WEIGHT SHIFT-ALL MODES IMPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
813	84	<1%	6,753	<1%	<1%	<1%	100,000	20,000	*-80%*
872	196	<1%	6,075	<1%	<1%	<1%	100,000	5,000	*-95%*
*523	13,544	6%	21,474	8%	1%	2%	2,900,000	4,484,000	55%
873	0	N/A	5,632	<1%	N/A	<1%	0	304,000	*NEW*
898	10	N/A	5,106	<1%	N/A	<1%	0	327,000	*NEW*
884	0	N/A	4,962	<1%	N/A	<1%	0	1,000	*NEW*
764	0	N/A	4,489	<1%	N/A	<1%	0	204,000	*NEW*
776	435	<1%	4,901	<1%	<1%	<1%	100,000	59,000	*-41%*
*057	120,804	1%	145,155	17%	1%	30%	1,400,000	69,977,000	*4898%*
059	0	N/A	3,618	<1%	N/A	<1%	0	129,000	*NEW*

$ = US Dollars
% = Vessel Weight Percentage (by SITC) Of Total Weight In Commodity And Of Total Vessel Weight In Trade (rounded)
** = Top-Twenty 1993 Vessel Value And Top-Twenty Total Weight Shift Commodity*

SITC	COMMODITY LIST
813	LIGHTING FIXTURES AND FITTINGS NES
872	INST & APPLIANCES, NES, FOR MED, SURG, DENT, OR VET PURP
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
873	METERS AND COUNTERS, NES
898	MUSICAL INSTRUMENTS AND PARTS, RECORDS, TAPES ETC.
884	OPTICAL GOODS, NES
764	TELECOMMUNICATIONS EQUIPMENT, NES & PTS, NES
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
059	FRUIT/VEG JUICES UNFERMENTED NOT INCL ADDED SPIRIT

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

section only, to avoid duplication: SITCs 778, 112, 664, 523, and 057. All remaining commodities were analyzed according to the shift-share logic described in the methodology. See Shift-Share Scenarios, p. 69. Also, see United Nations (1986) for a five-digit subdivision of all commodities included in this section of the three-digit analysis.

SITC 716 (Rotating Electric Plant And Parts Thereof, NES) is a medium-size, fast-growth commodity with a positive proportionality shift. Electrical goods are considered to be Mexican exports having strong growth potential (Journal Of Commerce, 1993, p. 4A). Nevertheless, ocean transportation has a negligible, but negative, differential shift that indicates some cargo loss to the air and land transport modes. Ocean transportation carried less than one TEU of SITC 716 in 1993, which was worth only $9,000. Regardless, this commodity had a total shift of over 24,300 TEUs between 1988 and 1993. It still has long-term potential for ocean transportation. SITC 716 is rapidly growing on a trade-wide basis, at an average rate of 7,856 percent over the above period. Overall, almost 24,800 TEUs of it moved north during 1993. "Mexico is strong in ...light manufacturing sectors, notably electrical equipment" (Fraser, 1992, p. 88). Even though ocean transportation has basically no market share in SITC 716, ocean carriers should try to capture more of it with appropriate marketing policies in the more southern production regions of Mexico. Maritime

transportation should only pursue shipments not moving in the maquiladora trade. This mode has practically no shipper recognition in SITC 716, which is a major obstacle to market entry.

SITC 054 (Vegs Frsh, Chld, Froz, Roots, Tubers Etc. Fresh, Dried) is a large, fast-growing commodity with positive proportionality and differential shifts. Carriers should definitely pursue this commodity due to "...the growing strength of Mexican agricultural exports to the United States, which stand to expand under the North American Free Trade Agreement" (Hall, 1994f, p. 1A). This commodity's high growth is evidenced by a total shift of over 24,300 TEUs. SITC 054's average overall growth rate between 1989 and 1993 was 53 percent. Ocean transportation also captured 35 TEUs of this commodity from land modes over the same period. Water transportation hauled only 50 TEUs of SITC 054, worth $460,000, during 1993. Nevertheless, more than 103,000 TEUs of this commodity moved north overall in the US-Mexico trade that year. Ocean transport clearly has a large pool of this cargo to go after; one that will probably grow even faster due to the peso crisis, at least in the short-term.

There are several developments in this commodity that may be of interest to ocean carriers. "TMM [Transportación Marítima Mexicana] ...purchased a stake in the Del Monte Fresh Produce Co., and that may yield new increases in

perishables traffic to the United States" (Hall, 1993c, p. 4C). The Mexican Port of Manzanillo is also positioning itself as a major hub for produce shipments with its refrigerated facilities (DiBenedetto, 1994, p. 1A; and Brennan, 1994, n.p.). See Appendix C, p. 336 for primary Mexican container port amenities. Carriers should also investigate the Mexican States of Sinaloa and Sonora because of their large output of fresh produce (Knee, 1993b, p. 56). Since 35 percent of Mexican fruits and vegetables spoil before reaching their intended markets, carriers should find ways to help shippers, as a value-added service, improve the Mexican distribution system (Mongelluzzo, 1994a, p. 2B). Top 1993 Mexican vegetable exports included tomatoes, pimentos, squash, asparagus, and other assorted produce (Hall, 1994f, p. 1A). Carriers should adopt aggressive marketing policies to improve shipper recognition in this growing market.

SITC 771 (Electric Power Machinery, And Parts Thereof) is a medium-size commodity with a total shift of almost 21,700 TEUs. Electrical machinery is considered to be a Mexican export with strong growth potential (Journal Of Commerce, 1993, p. 4A). It also has positive proportionality and differential shifts. The commodity is rapidly growing on a trade-wide basis and ocean transportation is capturing cargo, although in very small amounts, from other modes. It represents a good potential target for ocean carriers. Water transport, however, captured only one TEU of SITC 771 from

land transportation between 1989 and 1993. It had a negligible market share comprising seven TEUs in 1993, which were worth $217,000. Nevertheless, SITC 771 is a new commodity to ocean transportation since 1989 and over 22,100 TEUs moved north in the overall trade during 1993; a significant pool of cargo. "Mexico is strong in ...light manufacturing sectors, notably electrical equipment" (Fraser, 1992, p. 88). Ocean carriers should try to break into this trade with aggressive marketing policies, provided the cargo flows are not maquiladora industry traffic. Water transportation cannot effectively compete in this sector due to the maquiladora industry's present concentration along the US border. Ocean transport shipper recognition is also very small in SITC 771. This will make it more difficult for the mode to gain market share.

SITC 761 (Television Receivers) is a smaller, rapidly growing commodity, as evidenced by its total shift of over 16,200 TEUs. It has positive proportionality and differential shifts, as well. Television receivers are generally viewed as a principal Mexican export to the US (Kent, 1992, p. 9). SITC 761 experienced an average growth rate of 5,552 percent between 1989 and 1993. It is also a commodity new to US waterborne imports from Mexico since 1989. Although ocean transportation hauled only 16 TEUs of this commodity in 1993, they were worth over $1.5 million. SITC 761 was also a 1993 top-twenty ocean transport import

commodity by value. Ocean transportation captured 11 TEUs of television receivers from air transportation between 1989 and 1993. Land modes, however, continue to dominate this high-value commodity. More than 16,600 TEUs of SITC 761 moved north in the overall market during 1993. Most of this cargo, however, probably moved in maquiladora trade. Carriers should only pursue SITC 761 cargo not moving in the maquiladora trade.

SITC 697 (Household Equipment of Base Metal, NES) is a small to medium-size, fast-growth commodity that has a positive proportionality shift, but a negative differential shift. This commodity has long-term potential for waterborne carriers. It is growing faster than the trade-wide average, at a rate of 892 percent between 1989 and 1993. "For major household appliances, the increase in total NAFTA trade has been nothing less than startling" (Lautsch, 1993, p. 42). Appliances were actually one of the top-five Latin American containerized exports in 1992. Mexican exports in major household appliances are generally expected to continue growing (Traffic World, 1993, p. 20; and Mintz, 1993, p. 2). Nevertheless, ocean transport is losing appliance market share in the northbound US-Mexico trade to air and land transportation. Ocean transportation hauled only six TEUs of this commodity in 1993, which were worth $96,000. Maritime transport has a small degree shipper recognition in SITC 697. This mode was probably not meeting shipper needs, as

evidenced by its relatively high negative differential shift of 490 TEUs. About 50 TEUs of this import commodity previously moved by water during 1989. Nevertheless, over 13,900 TEUs of SITC 697 moved north in the 1993 US-Mexico trade. This is a small, but decent, pool from which to capture cargo. Ocean carriers should take action to turn this loss around. They need to determine which shipments of SITC 697 consist of consumer, not maquiladora trade, appliances and then target them with aggressive marketing policies.

SITC 248 (Wood, Simply Worked And Railway Sleepers Of Wood) is a smaller to medium-size, fast-growth commodity, as evidenced by its positive proportionality shift. It has a negative differential shift, however, which means this mode is losing market share. Nevertheless, it is a long-term potential commodity for maritime transportation. The mode lost 58 TEUs to land transportation between 1989 and 1993. Water transport moved 50 TEUs in 1993, which were worth $530,000. This is a very small market share of less than one percent and made up only a negligible share of total 1993 waterborne import commerce from Mexico. Regardless, over 17,500 TEUs of this commodity moved north overall in 1993. This is a significant amount of cargo, particularly since SITC 248 grew at an average rate of 170 percent between 1989 and 1993. Ocean transportation should take action to stop the cargo loss and improve its market share. Again,

maquiladora commerce should not be pursued due to the inherent disadvantages of ocean transportation in that sector. There is also a low level of shipper recognition in SITC 248 that ocean carriers need to overcome.

SITC 741 (Heating & Cooling Equipment And Pts Thereof) is a smaller, fast-growing commodity with positive proportionality and differential shifts. It is growing faster than the trade-wide average and ocean transportation is capturing this cargo from other modes. Ocean transport, however, captured only 22 TEUs from the land transport modes between 1989 and 1993. More specifically, ocean transportation hauled just 22 TEUs of SITC 741 in all of 1993, which were worth about $860,000. Thus, its market share was negligible that year. Nevertheless, over 8,200 TEUs of this commodity moved north in the overall US-Mexico trade during 1993. This is a small, but decent, pool of cargo. SITC 741 is also new to ocean transportation since 1989 and should be further developed, providing it is not moving in the maquiladora trade. Shipper recognition of ocean transportation is very low in this commodity, as well.

SITC 813 (Lighting Fixtures And Fittings NES) is a smaller, fast-growth commodity, as evidenced by its positive proportionality shift. It grew at an average rate of 7,939 percent between 1989 and 1993. This commodity has a negative differential shift, however, which means that water transport is losing part of its minimal market share to other modes.

It is a smaller, long-term potential commodity to the ocean transport sector. Maritime transportation lost seven TEUs to the air and land modes between 1989 and 1993. In 1993, ocean transportation hauled only one TEU of this commodity, which was worth $20,000. There were almost 6,800 TEUs of SITC 813 moving north in the overall trade that year. Ocean carriers should determine which portions of this trade include non-maquiladora commerce and target them with sound marketing policies. Nevertheless, a large segment of this commodity is likely to be associated with the maquiladora industry. Ocean carriers may wish to seek more attractive alternatives, even though this is a fast-growth, smaller-volume commodity. It is a borderline small lots trade cargo.

SITC 872 (Inst & Appliances, NES, For Med, Surg, Dent, Or Vet Purp) is a fast-growth, but borderline small lots trade commodity. This is evidenced by its positive proportionality shift and low total volume of just over 6,000 TEUs in 1993. Regardless, it grew faster than the trade-wide average rate at nearly 3,000 percent between 1989 and 1993. SITC 872, however, has a negative ocean transport differential shift, which indicates cargo loss. It lost three TEUs to air transportation between 1989 and 1993. Ocean transportation hauled less than one TEU of this commodity in 1993, which was worth $5,000. Ocean carriers should consider more attractive commodities due to the small pool of medical instruments available for capture. It is

still, however, a fast-growing commodity that could be developed to a limited degree. Cargo moving in the maquiladora trade should not be considered. Shipper recognition of ocean transportation, however, is almost non-existent in SITC 872.

Import Analysis By Remainder 1993 Vessel Value

This portion of the detailed shift-share analysis was not required for imports because of the following reasons. It will be required, however, for the exports analysis in Chapter 6. This section normally would have addressed any 1993 top-twenty high-value oceanborne import commodities remaining from the previous two analytical sections in this chapter. See Tables 6 and 7. It would have been done to assess ocean transportation's areas of greatest activity during 1993, by value. The results would have revealed cargo with higher-valued, long-term growth characteristics that had good potential for capture by maritime transportation. In this case, however, the eight remaining import commodities on Table 6 moved in trade-wide amounts of less than 6,000 TEUs (or 500 TEUs per month) during 1993. This was the imposed low-end cutoff figure for the larger lots trade. They are listed below and were excluded from further consideration due to insufficient volumes that year. They include: SITCs 845, 036, 841, 844, 894, 122, 842, and 763. See Table 7. There were twelve other commodities on the original top-twenty

TABLE 6

SHIFT-SHARE BASE OUTPUT: IMPORTS

(REMAINING HIGHEST VALUE OCEAN CARGOES LISTED BY 1993 VESSEL WEIGHT)

SUPPLEMENTAL COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
845	0	43	NEW	*OCEAN*	0	2	42	43
				AIR	3	320	-309	11
				LAND	9	890	267	1,157
				ALL				1,211
036	10	39	290%	*OCEAN*	2	-8	35	27
				AIR	2	-8	14	5
				LAND	2,660	-13,589	-49	-13,638
				ALL				-13,606
841	20	27	35%	*OCEAN*	3	4	0	3
				AIR	2	2	13	15
				LAND	165	184	-13	170
				ALL				188
844	0	23	NEW	*OCEAN*	0	1	23	23
				AIR	2	50	-35	16
				LAND	8	234	12	246
				ALL				285
894	20	16	-20%	*OCEAN*	3	-8	1	-7
				AIR	2	-4	46	42
				LAND	518	-1,227	-46	-1,274
				ALL				-1,239
122	20	14	-30%	*OCEAN*	3	-10	1	-9
				AIR	0	0	2	2
				LAND	1	-3	-3	-6
				ALL				-13
842	0	11	NEW	*OCEAN*	0	3	8	11
				AIR	2	334	-307	28
				LAND	3	652	299	951
				ALL				990
763	0	5	NEW	*OCEAN*	0	2	2	4
				AIR	0	0	5	5
				LAND	8	1,034	-7	1,028
				ALL				1,037

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
845	ARTICLES OF APPAREL OF TEXTILE FABRICS NES
036	CRUSTACEAN ETC. FRSH, CHLD, FROZ, DRIED, SALTED, ETC.
841	MEN'S OR BOYS' COATS, JACKETS ETC., TEXT, NOT KNIT
844	WOMEN'S OR GIRLS' COATS, CAPES ETC., TEXTILE, KNIT
761	TELEVISION RECEIVERS
894	BABY CARRIAGES, TOYS, GAMES AND SPORTING GOODS
122	TOBACCO, MFG WHETHER CONTAINING TOBACCO SUBSTITUTE
842	WOMEN'S & GIRL'S COATS, CAPES ETC., TEXT FABRIC, NOT KNIT
763	SOUND RECORDERS, TY RECORDERS, PREPARED UNRECORDED MEDIA

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 7

KEY ATTRIBUTES OF SUPPLEMENTAL HIGHEST VALUE OCEAN IMPORT CARGOES LISTED BY 1993 VESSEL WEIGHT

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
*845	76	<1%	1,300	3%	<1%	<1%	200,000	17,308,000	8554%
*036	16,040	<1%	5,098	1%	<1%	<1%	200,000	1,763,000	782%
*841	1,026	2%	1,385	2%	<1%	<1%	4,200,000	7,555,000	80%
*844	57	<1%	351	7%	<1%	<1%	100,000	7,476,000	7376%
*894	3,153	1%	2,437	1%	<1%	<1%	1,600,000	2,288,000	43%
*122	26	77%	17	82%	<1%	<1%	3,300,000	3,238,000	-2%
*842	30	<1%	1,024	1%	<1%	<1%	700,000	2,990,000	327%
*763	46	<1%	1,090	<1%	<1%	<1%	200,000	1,545,000	673%

$ = US Dollars
% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)
** = Top-Twenty 1993 Vessel Value Commodity Only*

SITC	COMMODITY LIST
845	ARTICLES OF APPAREL OF TEXTILE FABRICS NES
036	CRUSTACEAN ETC. FRSH, CHLD, FROZ, DRIED, SALTED, ETC.
841	MEN'S OR BOYS' COATS, JACKETS ETC., TEXT, NOT KNIT
844	WOMEN'S OR GIRLS' COATS, CAPES ETC., TEXTILE, KNIT
894	BABY CARRIAGES, TOYS, GAMES AND SPORTING GOODS
122	TOBACCO, MFG WHETHER CONTAINING TOBACCO SUBSTITUTE
842	WOMEN'S & GIRL'S COATS, CAPES ETC., TEXT FABRIC, NOT KNIT
763	SOUND RECORDERS, TY RECORDERS, PREPARED UNRECORDED MEDIA

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

ocean cargoes by value list, as well, which is located in Appendix K on p. 391. They were already eliminated or analyzed in the previous two sections of this chapter and were not included here to avoid duplication. The highest-value ocean cargoes from Appendix K were marked with asterisks on Table 3, p. 214 and on Table 5, p. 232. All twenty of those commodities were at least reviewed, due to their high oceanborne cargo value, to determine their growth characteristics and potential for capture by this mode. They were included in the study mainly because freight rates are based on the value a the commodity. Weight considerations, however, are far more important to waterborne commerce.

Summary

This study did not distinguish between intermediate inputs, maquiladora industry commerce or general consumer goods. Ocean transport marketing staffs, however, would need to do so to effectively utilize these results. It is also important for carriers to realize that, according to the US International Trade Commission, only 21 percent of all US exports to Mexico are re-exported to the US (Manzella, 1994, p. 33). This implies that not all trade in specific commodities, such as electrical equipment, consists of maquiladora commerce. Ocean carriers need to determine the actual percentage and focus marketing resources elsewhere until the in-bond industry is expanded farther south into

Mexico. The ocean transportation industry should also target the high-growth commodities revealed in this chapter. They should focus marketing resources on respective trade associations, individual shippers/consignees, and US State Trade Offices in Mexico that advise potential shippers from their respective states. See Encyclopedia Of Associations (1994a) for a detailed listing of related international trade associations and Hall (1995f) for a list of US State Trade Offices in Mexico City. The Mexican Peso crisis will likely generate, at least in the short-term, additional growth in or a slowing in the decline of the various import commodities analyzed in Chapter 5.

> The peso devaluation in December hurt the purchasing power of Mexican consumers for overseas products. As a result, imports of consumables and other goods have declined. That has been reflected in a decline in carrier volumes. However, there is a steady flow of import traffic [from Mexico] (Wastler, 1995, p. 1B).

The imports listed in this paragraph represent the largest, most attractive target commodities for aggressive, long-term, ocean transport marketing strategies, particularly in the more southern areas of Mexico. They are the best-case import opportunities excluding maquiladora traffic. These import commodities are rapidly growing on a trade-wide basis and are being captured by ocean transportation in either larger or smaller amounts. They were moving in total 1993 trade volumes exceeding 20,000 TEUs and include: SITC 057 (Fruit, Nuts (Not Including Oil Nuts) Fresh Or Dried); SITC

112 (Alcoholic Beverages); SITC 523 (Metallic Salts And Peroxysalts Of Inorganic Acids); SITC 664 (Glass); SITC 054 (Vegs Frsh, Chld Froz, Roots, Tubers, Etc. Fresh, Dried); and SITC 771 (Electric Power Machinery, And Parts Thereof). The results of this study, however, must be used in conjunction with other inputs when formulating sound marketing policies. One particular case that occurred in 1993 illustrates this point. Mexican Gulf Line had a cross-Gulf service in the US-Mexico trade and was targeting the general commodities listed above. This was completely appropriate, as verified by the study. Nevertheless, it was forced to terminate operations in December 1993 due to insufficient volumes (Tirschwell, 1993b, p. 8B). This indicates that a tremendous lack of shipper recognition and/or customer satisfaction still exists in regard to US-Mexico water transport services (Tirschwell, 1993a, p. 1B; and Tirschwell, 1994, p. 5A). It also highlights the importance of a multifaceted approach to marketing policy formulation. A prudent manager never relies on only one source of information.

> To formulate policies and plans which respond to non-traditional problems, reliance must be placed on something more than [just] historical trend analyses and projections, as the mechanical application of these tools can result in mere extrapolations of already fossilized events (United Nations, 1989, p. 18).

Despite the problems encountered by Mexican Gulf Line, the above import commodities still reflect the trade's best prospects for long-term growth and potential for capture by

ocean-liner operators. More emphasis, however, needs to be placed on improving shipper recognition and customer satisfaction.

The import commodities listed in this paragraph represent the best-case, but more limited, opportunities for cargo capture by ocean transportation. Although water transport is capturing these fast-growth import commodities from the competition, overall volumes were less than 20,000 TEUs in 1993. Nevertheless, these commodities provide capture opportunities for ocean carriers, particularly in more southern areas of Mexico, regardless of the lower 1993 total amounts hauled by water. NAFTA will most-likely accelerate their long-term growth, particularly once the peso crisis has passed. Thus, carriers should still consider targeting these commodities, as long as they do not consist of maquiladora commerce. Ocean transportation cannot effectively compete in the maquiladora trade at the present time. This is a good example of why carriers need to further analyze all commodities at the five-digit level to determine market-specific peculiarities. They include: SITC 761 (Television Receivers) and SITC 741 (Heating & Cooling Equipment And Parts Thereof).

The import commodities listed in this paragraph represent good, long-term potential opportunities for ocean carriers because they are fast-growing on a trade-wide basis and were moving north in 1993 volumes exceeding 20,000 TEUs.

The problem with these commodities is that ocean transportation is losing market share in them, albeit a share that was already small, to other modes in the trade. This indicates low shipper recognition, better marketing by the other modes, uneconomical routes or the possibility that ocean transportation is not meeting shipper needs. In addition, much of the traffic in the following commodities probably comprises maquiladora commerce. Ocean transportation cannot effectively compete for cargo moving in that trade at the present time. Regardless, cargo capture is an endogenous force that ocean carriers can exert some control over. They should still target the following commodities with well-planned marketing strategies, particularly in the more southern industrial regions of Mexico, to stop the cargo loss and gain back market share: SITC 778 (Electrical Machinery And Apparatus, NES) and SITC 716 (Rotating Electric Plant And Parts Thereof, NES).

The import commodities listed in this paragraph represent good long-term potential, but more limited, opportunities for ocean carriers. They are fast-growing trade-wide, but were moving in 1993 trade-wide volumes of less than 20,000 TEUs; hence a smaller pool of cargo is available for capture. The other problem with these commodities is that ocean transportation is losing market share in them, a share that was already small, to other modes in the trade. This could indicate low shipper recognition,

better marketing by other modes, or the possibility that ocean transportation is not meeting shipper needs. In addition, ocean transportation cannot effectively compete for segments of the following cargoes that move in the maquiladora trade. Regardless, cargo capture is an endogenous force that ocean carriers can exert some control over, particularly in the more southern industrial areas of Mexico. These commodities include: SITC 697 (Household Equipment Of Base Metal, NES); SITC 248 (Wood, Simply Worked And Railway Sleepers Of Wood); SITC 813 (Lighting Fixtures And Fittings NES); and SITC 872 (Inst And Appliances, NES, For Med, Surg, Dent, Or Vet Purp).

The import commodities listed in this paragraph are declining on a trade-wide basis, but still represent good, short-term opportunities to maximize any remaining benefits. Long-term marketing strategies, however, should not consider these cargoes. Ocean carriers should only pursue SITCs 522 and 679 on a short-term basis, if at all, to capture any remaining market share. They moved north in 1993 trade-wide volumes exceeding 145,000 TEUs and 14,000 TEUs, respectively. These commodities may be attractive short-term targets for, say, certain low-rated backhauls; trades that can be quite competitive. "The key to making money is coming back with a backhaul" (Hamilton, 1993, p. 6C). Market realities may demand continued service in them by ocean transportation, where shipper recognition is already fairly high. They

include: SITC 522 (Inorganic Chemical Elements, Oxides, Halogen Salts) and SITC 679 (Iron & Steel Tubes, Pipes & Hollow Profiles, Fittings).

Finally, the import commodity, SITC 071 (Coffee And Coffee Substitutes), is declining on a trade-wide basis and ocean transportation is losing market share in it. This is a worst-case scenario for maritime transportation. Only about 1,800 TEUs of this import commodity moved by water in 1993, out of a total of approximately 18,500 TEUs moving trade-wide. Ocean transport's market share in 1993, however, was worth over $23.7 million. Regardless, this commodity should not be pursued because it is declining on a trade-wide basis and ocean transportation is losing cargo to land transport modes. Coffee, however, is still experiencing a shift "...from breakbulk to container traffic..." (Selwitz, 1993, p. 26). Despite this, it should be put on present customer accommodation status, at the most, because of the substantial value still involved. This would release limited marketing resources for more effective application towards attracting other long-term, higher-growth cargoes.

All commodities analyzed in this chapter should only be included in or excluded from long-term, strategic marketing plans after further assessment at the five-digit level. See United Nations (1986) for a five-digit subdivision of all three-digit SITC commodities listed above. Moreover, the optimal choice may not always be feasible due to trade

realities, such as the current location of most maquiladora operations along the US-Mexico border or the ramifications of inherent commodity characteristics. This study did not address the small lots trade.

CHAPTER SIX

EXPORT ANALYSIS

Shift-Share Output: Exports

US Department Of Commerce general cargo export statistics were processed using the shift-share model. The results were analyzed and interpreted in further detail to draw valid conclusions about cargo capture trends in the US-Mexico trade. Emphasis was placed on conventional ocean-liner operations throughout this chapter. Twenty-foot equivalent units, or TEUs, were used in the export analysis to reflect equivalent weight characteristics, i.e. one TEU equals approximately ten metric tons. Again, the usage of TEUs did not represent, nor intend to represent, the actual number of marine containers moving south in the US-Mexico trade.

Maritime industry decision-makers must rationalize limited resources by targeting US-Mexico long-term growth commodities that are amenable to containerized transport and capture by ocean transportation. For this reason, and to make the study more manageable, only the export commodities appearing on the top-twenty 1993 Vessel Weight, top-twenty Total Weight Shift-All Modes, and top-twenty 1993 Vessel Value lists (with an emphasis on weight characteristics) were

chosen for further study. These categories were selected because they were likely to contain high-growth commodities that were most attractive for capture by the ocean transport sector. See Appendix L, p. 392 for all commodities on each of these lists. This study did not disaggregate maquiladora industry commerce from the overall trade. Regardless, the final results of the export analysis can be used by the maritime transport sector in several ways. They reveal a choice of high-growth commodities from which carriers could formulate long-term marketing campaigns, strategic-growth policies, newbuilding programs or development plans at liner-operated marine terminals.

Aggregate Export Analysis

The shift-share export results were aggregated by weight and value to determine the overall status of maritime transportation in the US-Mexico general cargo trade. See Table 8. In 1989, ocean transportation had a two percent market share, by weight, hauling approximately 12,600 TEUs of general cargo. This share was superior to that of air transportation, which had a 1989 market share of less than one percent consisting of about 2,570 TEUs. Ocean transportation, however, had a very small 1989 market share, compared to land transportation. The latter mode had an approximately 98 percent share, which consisted of almost 673,000 TEUs. Ocean transportation's position improved

TABLE 8

MODAL MARKET SHARE OF ALL EXPORT COMMODITIES EXCELLENT OR SUITABLE FOR CONTAINERIZED TRANSPORT IN THE US-MEXICO TRADE

US EXPORTS BY WEIGHT

TRANSPORT MODE	1989 TOT WEIGHT *(TEUs)*	1989 MKT SHR *(By Mode)*	1993 TOT WEIGHT *(TEUs)*	1993 MKT SHR *(By Mode)*
OCEAN	12,600	2%	48,211	3%
AIR	2,570	<1%	3,374	<1%
LAND	672,933	98%	1,488,381	97%
TOTAL	688,103		1,539,966	

US EXPORTS BY VALUE

TRANSPORT MODE	1989 TOT VALUE *($)*	1989 MKT SHR *(By Mode)*	1993 TOT VALUE *($)*	1993 MKT SHR *(By Mode)*
OCEAN	227,750,000	1%	385,347,000	1%
AIR	1,024,850,000	5%	2,083,369,000	6%
LAND	17,802,100,000	93%	31,581,745,900	93%
TOTAL	19,054,700,000		34,050,461,900	

TEU = Weight In Twenty-foot Equivalent Units (approx. 10 metric tons)
$ = Value In US Dollars
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

Note: Total Trade Maximum Rounding Error Is 22 TEUs (due to conversion from metric tons).

Sources: US Department of Commerce (1989 and 1993b) and author's calculations

slightly by 1993, to a three percent share between 1989 and 1993, at an average growth rate of 243 percent. This was much higher than the 43 percent average growth rate for waterborne imports over the same period. In 1993, however, ocean transportation's general cargo imports exceeded waterborne exports by almost 35,000 TEUs. Almost 83,000 TEUs of imports moved by water that year, compared to just over 48,200 TEUs of export cargo. Nevertheless, 1993 waterborne exports were still greater than air transport's small, but increasing, share by weight (less than one percent at almost 3,400 TEUs). Both ocean and air transportation were dwarfed, as with imports, by land transport's approximately 97 percent market share that year. This share consisted of nearly 1,500,000 TEUs. The overall general cargo export trade, in TEUs, grew by an average rate of 124 percent between 1989 and 1993.

When ocean transportation's performance was analyzed by value, an even greater disparity in market share was revealed. Weight characteristics, however, are still more important to waterborne commerce. Ocean transportation handled almost $228 million of general cargo during 1989, which was much less than the over $1 billion of air cargo hauled that year. Ocean transport's market share was only about one percent, while air transportation had a five percent share. Land transportation handled over $17.8 billion in general cargo during 1989, which reflected a 93

percent share of the export market. In 1993, ocean transport maintained its approximately one percent market share with a higher total value of over $385 million. This reflected a 69 percent average growth rate by value between 1989 and 1993. Air transportation, however, experienced tremendous growth between 1989 and 1993. Its market share grew to six percent in 1993, which was worth over $2 billion. This indicates an average growth rate of 103 percent over the period. Total airborne export cargo was worth 5.4 times the value of total waterborne export cargo in 1993. These figures indicate that air transportation made great progress over the period in higher-valued cargo, the mainstay of its operations. Land transportation also experienced a strong growth rate between 1989 and 1993, which was about 77 percent on average. The land transport sector maintained its 93 percent share of the total market and handled a tremendous $31.5 billion in general cargo during 1993. The overall general cargo export trade, in US Dollars, grew by an average rate of 79 percent between 1989 and 1993.

The figures shown in Table 8, p. 255 indicate that ocean transportation was moving predominantly heavier, lower-valued general cargo between 1989 and 1993. Marine transportation, however, did show some improvement over the period, particularly by weight. This was probably gained at the expense of land transportation, which lost a percentage point of market share, in TEUs, between 1989 and 1993. The slight,

overall improvement by ocean transportation also indicates that the true impact of Mexico's port upgrade program is only beginning to be realized. Tremendous growth experienced by land transportation, however, indicates that shippers still have strong ties with the trucking and rail sectors, in regard to US-Mexico general cargo. Air transportation is making substantial progress in higher-value cargo, which is far more important to the mode than weight characteristics. This portion of the study sought to reveal the status of waterborne general cargo exports in the US-Mexico trade between 1989 and 1993. The next section identified high-growth commodities amenable to capture by ocean-liner companies.

In-Depth Export Analysis

Three base output tables, comprised of relevant shift-share export statistics, were created from the raw data. This was done to allow a detailed analysis of the trade's general cargo flows. These tables include only the top-twenty 1993 Vessel Weight, top-twenty Total Weight Shift-All Modes, and remainder top-twenty 1993 Vessel Value export commodities to make the study manageable and to isolate the most promising commodities. The purpose of this section was to provide ocean transport managers with a concise list of optimal liner cargoes that are amenable to capture by waterborne containerized transport. These three base output

tables were further expanded into accompanying cross-reference tables to facilitate a more comprehensive analysis of relevant commodities. Each base output table was analyzed separately throughout the remainder of this chapter.

Export Analysis By 1993 Vessel Weight

The first section of the detailed shift-share analysis assessed, by weight in TEUs, the top-twenty 1993 export commodities hauled by ocean transportation. See Tables 9 and 10. This was done to reveal those commodities moving south in the US-Mexico trade that have strong, long-term growth characteristics and good potential for capture by maritime transportation. The following commodities are generally considered to be some of the principal US exports to Mexico:

> Exports to Canada and Mexico account for over half of total U.S. exports of furniture, goods of the printing and publishing industry, building materials, metals, audio/video equipment, and motor vehicles/auto parts. [Also,] [e]xports to Canada and Mexico account for over 25 percent of total U.S. exports in 18 other sectors, including processed foods, paper and paper products, chemicals and plastics, textiles, electrical equipment, and electronic components (National Trade Data Bank, 1994b, CD-ROM).

As with imports, only export commodities moving in total amounts of at least 6,000 TEUs (or 500 TEUs per month) during 1993 were analyzed further. Overall cargo flows of at least 500 TEUs per month, by commodity, were designated as the low-end cutoff point for the larger lots market. This study focused on the higher-volume cargoes that can be more readily

TABLE 9

SHIFT-SHARE BASE OUTPUT: EXPORTS
(LISTED BY 1993 VESSEL WEIGHT)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
516	1,030	21,669	2004%	*OCEAN*	1,275	1,507	17,857	19,364
				AIR	0	0	7	7
				LAND	18,218	21,531	-17,864	3,667
				ALL				23,038
248	60	4,109	6748%	*OCEAN*	74	-42	4,016	3,975
				AIR	0	0	5	5
				LAND	47,759	-26,686	-4,021	-30,707
				ALL				-26,727
598	2,680	3,006	12%	*OCEAN*	3,318	-4,014	1,022	-2,991
				AIR	25	-30	33	3
				LAND	27,415	-33,169	-1,056	-34,225
				ALL				-37,213
634	50	1,946	3792%	*OCEAN*	62	1	1,832	1,834
				AIR	0	0	7	7
				LAND	15,350	333	-1,839	-1,506
				ALL				335
522	3,350	1,921	-43%	*OCEAN*	4,147	-4,503	-1,073	-5,576
				AIR	12	-13	-3	-17
				LAND	84,848	-92,136	1,076	-91,060
				ALL				-96,653
642	170	1,433	743%	*OCEAN*	210	148	904	1,052
				AIR	74	52	-100	-47
				LAND	43,292	30,378	-805	29,574
				ALL				30,579
597	10	1,274	12640%	*OCEAN*	12	130	1,122	1,252
				AIR	0	1	9	10
				LAND	1,077	11,272	-1,131	10,141
				ALL				11,403
081	290	1,120	286%	*OCEAN*	359	-336	806	471
				AIR	0	0	2	2
				LAND	77,423	-72,375	-809	-73,184
				ALL				-72,711
744	150	1,007	571%	*OCEAN*	186	251	420	672
				AIR	25	34	-57	-24
				LAND	2,906	3,936	-363	3,573
				ALL				4,221
641	70	992	1317%	*OCEAN*	87	279	556	835
				AIR	37	120	-142	-22
				LAND	14,219	45,788	-414	45,374
				ALL				46,187

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
516	ORGANIC CHEMICALS, NES
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
598	MISCELLANEOUS CHEMICAL PRODUCTS, NES
634	VENEERS, PLYWOOD, PARTICLE BRD, OTHER WORKED WOOD NES
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
081	FEEDING STUFF FOR ANIMALS NOT INCL UNMILLED CEREAL
744	MECHANICAL HANDLING EQUIPMENT, & PTS THEREOF, NES
641	PAPER AND PAPERBOARD

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 9
(CONTINUED)

SHIFT-SHARE BASE OUTPUT: EXPORTS
(LISTED BY 1993 VESSEL WEIGHT)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 (TEUs)	VSLWT 93 (TEUs)	VSLWT CHANGE	TRANSP MODE	TDSHR (TEUs)	PROSFT (TEUs)	DIFSFT (TEUs)	TOTSFT (TEUs)
247	20	881	4305%	*OCEAN*	25	69	766	836
				AIR	0	0	0	0
				LAND	1,609	4,511	-766	3,745
				ALL				4,581
554	1,230	727	-41%	*OCEAN*	1,523	925	-2,950	-2,026
				AIR	0	0	3	3
				LAND	8,548	5,191	2,948	8,139
				ALL				6,116
523	60	683	1038%	*OCEAN*	74	-24	572	549
				AIR	0	0	2	2
				LAND	31,975	-10,236	-575	-10,811
				ALL				-10,260
112	50	668	1236%	*OCEAN*	62	-2	558	556
				AIR	12	0	-18	-18
				LAND	4,197	-160	-541	-701
				ALL				-163
574	10	544	5340%	*OCEAN*	12	78	444	521
				AIR	0	1	1	2
				LAND	4,939	30,977	-445	30,532
				ALL				31,055
571	110	428	289%	*OCEAN*	136	-84	266	182
				AIR	0	0	0	0
				LAND	23,394	-14,404	-266	-14,670
				ALL				-14,488
679	120	371	209%	*OCEAN*	149	204	-102	102
				AIR	12	17	-32	-15
				LAND	2,080	2,854	134	2,988
				ALL				3,075
662	110	281	155%	*OCEAN*	136	-44	78	35
				AIR	12	-4	-16	-20
				LAND	3,592	-1,148	-62	-1,211
				ALL				-1,196
023	40	224	460%	*OCEAN*	50	-48	183	134
				AIR	0	0	0	0
				LAND	1,613	-1,570	-183	-1,752
				ALL				-1,618
111	40	216	440%	*OCEAN*	50	654	-528	126
				AIR	0	0	4	4
				LAND	1,089	14,388	524	14,912
				ALL				15,042

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
247	WOOD IN THE ROUGH OR ROUGHLY SQUARED
554	SOAP, CLEANSING AND POLISHING PREPARATIONS
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
112	ALCOHOLIC BEVERAGES
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
571	POLYMERS OF ETHYLENE, IN PRIMARY FORMS
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
662	CLAY AND REFRACTORY CONSTRUCTION MATERIALS
023	BUTTER AND OTHER FATS AND OILS DERIVED FROM MILK
111	NON-ALCOHOLIC BEVERAGES, NES

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 10

KEY ATTRIBUTES OF TOP-TWENTY 1993 VESSEL WEIGHT EXPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
*516	15,747	7%	58,278	37%	8%	45%	5,900,000	59,331,000	*906%*
*248	38,640	<1%	59,746	7%	<1%	9%	200,000	17,113,000	*8457%*
*598	24,847	11%	18,391	16%	21%	6%	11,000,000	27,973,000	*154%*
*634	12,450	<1%	28,196	7%	<1%	4%	200,000	9,041,000	*4421%*
522	71,901	5%	64,256	3%	27%	4%	5,000,000	3,367,000	*-33%*
*642	35,201	<1%	109,356	1%	1%	3%	2,100,000	8,641,000	*311%*
*597	880	1%	13,373	10%	<1%	3%	400,000	6,480,000	*1520%*
081	62,833	<1%	67,905	2%	2%	2%	600,000	3,550,000	*492%*
*744	2,518	6%	9,855	10%	1%	2%	10,600,000	27,762,000	*162%*
*641	11,586	1%	72,116	1%	1%	2%	1,100,000	5,504,000	*400%*

$ = US Dollars
% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)
** = Top-Twenty 1993 Vessel Value And Top-Twenty 1993 Vessel Weight Commodity*

SITC	COMMODITY LIST
516	ORGANIC CHEMICALS, NES
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
598	MISCELLANEOUS CHEMICAL PRODUCTS, NES
634	VENEERS, PLYWOOD, PARTICLE BRD, OTHER WORKED WOOD NES
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
081	FEEDING STUFF FOR ANIMALS NOT INCL UNMILLED CEREAL
744	MECHANICAL HANDLING EQUIPMENT, & PTS THEREOF, NES
641	PAPER AND PAPERBOARD

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 10
(CONTINUED)

KEY ATTRIBUTES OF TOP-TWENTY 1993 VESSEL WEIGHT EXPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
247	1,320	2%	7,535	12%	<1%	2%	100,000	2,264,000	2164%
554	8,135	15%	24,322	3%	10%	2%	4,400,000	2,434,000	-45%
523	25,890	<1%	47,680	1%	<1%	1%	200,000	1,637,000	719%
*112	3,450	1%	7,558	9%	<1%	1%	500,000	5,119,000	924%
574	4,000	<1%	40,008	1%	<1%	1%	100,000	1,441,000	1341%
571	19,008	1%	28,050	2%	1%	1%	1,000,000	3,197,000	220%
*679	1,810	7%	7,126	5%	1%	1%	4,400,000	5,440,000	24%
662	3,021	4%	5,566	5%	1%	1%	800,000	1,486,000	86%
023	1,343	3%	1,387	16%	<1%	<1%	600,000	3,550,000	492%
111	920	4%	17,101	1%	<1%	<1%	200,000	908,000	354%

$ = US Dollars
% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)
** = Top-Twenty 1993 Vessel Value And Top-Twenty 1993 Vessel Weight Commodity*

SITC	COMMODITY LIST
247	WOOD IN THE ROUGH OR ROUGHLY SQUARED
554	SOAP, CLEANSING AND POLISHING PREPARATIONS
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
112	ALCOHOLIC BEVERAGES
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
571	POLYMERS OF ETHYLENE, IN PRIMARY FORMS
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
662	CLAY AND REFRACTORY CONSTRUCTION MATERIALS
023	BUTTER AND OTHER FATS AND OILS DERIVED FROM MILK
111	NON-ALCOHOLIC BEVERAGES, NES

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

captured by larger, conventional ocean-liner vessels. It did not analyze the small lots market. The following commodities were excluded from the remainder of the study due to insufficient 1993 cargo flows: SITCs 662 and 023. See Table 10, p. 262. The remaining commodities were analyzed in this section according to the shift-share logic described in the methodology. See Shift-Share Scenarios, p. 69. This was done to reveal fast-growth cargoes amenable to long-term capture by ocean transportation. Also, see United Nations (1986) for a five-digit subdivision of all commodities included in the three-digit analysis. In the following analysis, a positive proportionality shift indicates that a commodity is growing faster than the trade-wide average for all export cargoes included in the study; a negative one indicates declining or slower-than-average growth. A positive differential shift indicates cargo capture by a mode; a negative one indicates cargo loss by a mode. Thus, inverse differential shift signs reflect competition. This study focused on ocean transportation trade share, proportionality, and differential shift factors unless otherwise noted.

The first commodity, SITC 516 (Organic Chemicals, NES), should definitely be pursued by ocean carriers due to its excellent long-term growth characteristics and good potential for capture by ocean transportation. Chemicals are generally considered to be a principal US export to Mexico (Kent, 1992,

p. 9). This larger commodity had an overall average growth rate of 270 percent between 1989 and 1993. It has a positive proportionality shift, as well as a strong, positive differential shift. SITC 516 is fast-growing on a trade-wide basis and ocean transport captured over 17,800 TEUs from the land modes between 1989 and 1993. More than 21,600 TEUs of this commodity, worth over $59 million, moved by water in 1993. This was up from just over 1,000 TEUs moving by water in 1989 and it accounted for 45 percent of all 1993 waterborne export commerce in general cargoes. Ocean carriers realized a 2,004 percent average growth rate by weight in this commodity between 1989 and 1993. Marine transportation's market share in SITC 516 was 37 percent in 1993, out of a total of over 58,000 TEUs moving south in the overall trade.

Tremendous amounts of SITC 516 are available for capture and carriers should adopt aggressive marketing policies to expand their market share. They should be targeting shippers and trade groups, such as the Chemical Manufactures Association. Much of this cargo can also be moved by intermodal tank containers, which comprise a "...small, but growing, part of the U.S. chemical transportation industry" (Gottschalk, 1994, p. 5C). Moreover, "[s]maller ports along the Gulf Coast are also eyeing tank containers as part of their cargo flow" (Telfer and Hall, 1994, p. 8A). The Mexican Peso crisis, however, will probably make SITC 516

more expensive to Mexicans and hinder short-term growth. The fact that ocean transport is doing rather well in this commodity indicates wider shipper recognition. Thus, carriers should try to enhance this momentum with sound marketing policies. The literature review indicated that shipper recognition is one of the biggest obstacles presently facing ocean carriers in the US-Mexico trade. SITC 516 is also one of the 1993 top-twenty ocean transport export commodities by value, as well as one of the top-twenty total weight shift commodities.

SITC 248 (Wood, Simply Worked And Railway Sleepers Of Wood) has a negative proportionality shift, but a positive differential shift. It is also a larger commodity that is growing slower than the trade-wide average, as evidenced by its negative total shift of over 26,700 TEUs.

> ...[T]he diverse businesses involved in the building materials industries should see growing opportunities south of the border for years to come. Some segments — like lumber — must educate Mexican builders about the advantages of their products before they will see dramatic increases (Taylor, 1993b, p. 15A).

Nevertheless, ocean transportation captured over 4,000 TEUs from land transport modes between 1989 and 1993. It also had an average growth rate of 6,748 percent in this commodity over the same period. Maritime transport handled over 4,100 TEUs of SITC 248 in 1993, which were worth over $17.1 million. It accounted for nine percent of all waterborne general cargo exports that year. Ocean carriers may want to

develop short-term policies to try and capture the remainder of this cargo, which moved south in an absolute amount of almost 60,000 TEUs during 1993, to maximize any remaining benefits. Since this commodity makes up a large portion of total waterborne commerce, it should be considered as an alternative target on a short-term basis. Lumber was actually one of the top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). It should keep moving into Mexico as long as the "...government continues to raise expectations for better housing" (Taylor, 1993b, p. 15A). SITC 248 is one of the 1993 top-twenty ocean transport export commodities by value, as well. Regardless, the most desirable cargoes are rapidly growing on a trade-wide basis.

SITC 598 (Miscellaneous Chemical Products, NES) is a medium-size commodity with a negative proportionality shift, but a positive differential shift. Even though it is declining on a trade-wide basis, it has some short-term potential for ocean transportation. Much of this cargo can be moved by intermodal tank containers, as well, which comprise a "...small, but growing, part of the U.S. chemical transportation industry" (Gottschalk, 1994, p. 5C). Maritime transport hauled over 3,000 TEUs of this commodity, worth almost $28 million, during 1993. It is also capturing SITC 598 from other modes. Between 1989 and 1993, ocean transport captured over 1,000 TEUs of miscellaneous chemical products

from land transportation and experienced a 12 percent average growth rate. It had a 16 percent share of this commodity during 1993, which accounted for six percent of total waterborne exports that year. More than 18,000 TEUs of SITC 598 moved south in the overall US-Mexico trade during 1993. Thus, ocean carriers may want to pursue this commodity with short-term marketing policies to capture any remaining market share. They should only do so, however, because it accounts for a significant share of total waterborne export traffic. Moreover, SITC 598 is one of ocean transportation's 1993 top-twenty export commodities by value in the US-Mexico trade. Regardless, it has only short-term potential for the mode.

SITC 634 (Veneers, Plywood, Particle Brd, Other Worked Wood NES) is a fast-growth commodity with good potential for long-term capture by ocean transportation.

> ...[T]he diverse businesses involved in the building materials industries should see growing opportunities south of the border for years to come. Some segments — like lumber — must educate Mexican builders about the advantages of their products before they will see dramatic increases (Taylor, 1993b, p. 15A).

The Mexican Peso crisis will probably slow growth in this commodity, at least in the short-term. SITC 634 had an overall average growth rate of 126 percent between 1989 and 1993. It has positive proportionality and differential shifts. Ocean transportation moved over 1,900 TEUs of SITC 634 in 1993, which represents a 3,792 percent increase over the 50 TEUs it hauled in 1989. Over $9 million worth of this

commodity moved by water in 1993, which accounted for about four percent of ocean transport's southbound cargo flows that year. It captured over 1,800 TEUs from land transportation between 1989 and 1993. Ocean transportation also had a seven percent share of the more than 28,000 TEUs overall moving south in 1993. Maritime transportation has increasing shipper recognition with SITC 634, which is hard to achieve in the US-Mexico trade. Carriers should aggressively market their services to increase this momentum. There are significant amounts of SITC 634 available for capture and ocean carriers should actively pursue them because of the commodity's good, long-term growth potential (Taylor, 1993b, p. 15A). It is also a 1993 top-twenty ocean transport export commodity by value.

SITC 522 (Inorganic Chemical Elements, Oxides, Halogen Salts) is a larger, but poor, alternative for ocean transportation. It has negative proportionality and differential shifts. The commodity is rapidly declining on a trade-wide basis due to exogenous factors. This is evidenced by its negative total shift of over 96,600 TEUs. Moreover, ocean transport lost more than 1,000 TEUs of SITC 522 to land transportation between 1989 and 1993. Nevertheless, water transport moved about 1,900 TEUs in 1993, which were worth roughly $3.3 million. This represented a three percent market share for ocean transportation, out of the approximately 64,000 TEUs moving south in all modes that

year. SITC 522 accounted for four percent of total southbound waterborne commerce in 1993, compared to a 27 percent share in 1989. The commodity should not be pursued by ocean carriers, except perhaps to maintain present customers because of its continued significant value and numbers of TEUs still moving by water. SITC 522 is declining trade-wide and ocean transportation is losing market share. Carriers should try to direct their limited resources towards capturing long-term, high-growth cargoes instead.

SITC 642 (Paper And Paperboard, Cut To Size Or Shape, Articles) should be aggressively pursued by ocean carriers to ensure an improving market share in this larger, fast-growth commodity. It had an overall average growth rate of 211 percent between 1989 and 1993. Forest products are generally considered to be a principal Mexican import (Kent, 1992, p. 9). Cardboard boxes are also a big segment of this US export to Mexico (Knee, 1993b, p. 56). SITC 642 has a positive proportionality shift, as well as a positive differential shift. It is fast-growing on a trade-wide basis and ocean transport captured over 900 TEUs from the air and land modes between 1989 and 1993. Almost 1,500 TEUs of this commodity, worth over $8.6 million, moved by water in 1993. This was up from 170 TEUs moving by water in 1989 and accounted for three percent of ocean transport's total export commerce in 1993. Ocean carriers realized a 1,433 percent average growth rate by weight in this commodity between 1989 and 1993. Maritime

transportation's market share was one percent in 1993, out of a total of almost 110,000 TEUs of paper and paperboard moving south overall. Substantial amounts of this commodity are available for capture and carriers should adopt aggressive marketing policies to expand their market share. The Mexican Peso crisis, however, will probably make it more expensive to Mexicans and hinder short-term growth. Ocean transport has small, but improving shipper recognition in SITC 642. It is also one of the 1993 top-twenty ocean transport export commodities by value, as well as one of the top-twenty total weight shift commodities. The latter indicates a high-growth cargo.

SITC 597 (Additives For Mineral Oils Etc., Anti-Freeze Etc. Preps) is a smaller to medium-size commodity with positive proportionality and differential shifts. The commodity is growing rapidly on a trade-wide basis and ocean transportation is capturing it from other modes. Much of this cargo can also be moved by intermodal tank containers, which comprise a "...small, but growing, part of the U.S. chemical transportation industry" (Gottschalk, 1994, p. 5C). Ocean transport captured over 1,100 TEUs from land transportation between 1989 and 1993. It also had a ten percent market share comprising over 1,200 TEUs in 1993, which were worth almost $6.5 million. SITC 597 grew at an overall average rate of 1,420 percent between 1989 and 1993, while over 13,000 TEUs moved south in 1993. This is a

smaller, but still significant pool of cargo. Ocean carriers should try to break into this trade with aggressive marketing policies. Ocean transport experienced a 12,640 percent average growth rate between 1989 and 1993. Shipper recognition is rapidly improving for waterborne carriers in this commodity. They should take action to reinforce it. SITC 597 is also a 1993 top-twenty ocean transport export cargo by value and a top-twenty total weight shift commodity. The latter indicates rapid growth.

SITC 081 (Feeding Stuff For Animals Not Incl Unmilled Cereals) is a good, short-term alternative for ocean transportation. It has a negative proportionality shift, but a positive differential shift. Carriers may want to maximize the current benefits of this commodity by adopting short-term policies designed to capture remaining market share. SITC 081 is growing more slowly than the trade-wide average due to exogenous factors. The Mexican Peso crisis will probably slow this growth even further, at least in the short-term. Aside from this, however, carriers should remember that "[t]he United States is the main supplier of pet food to Mexico and has little competition." Larger Mexican supermarkets sell about 70 percent of US pet food exports, which target wealthier consumers (Wilson, 1994, p. 4A). Also, "[s]ince most ...Mexican pet owners apparently feed their animals table scraps, U.S. pet food manufacturers have tapped into a Department of Agriculture export-promotion

program that provides funding for public awareness marketing campaigns in Mexico..." (Hall, 1994a, p. 8A). This commodity may even become a fast-growth commodity once Mexico's economic problems subside and consumers have more disposable income (Hall, 1994a, p. 1A). Ocean transport captured more than 800 TEUs of SITC 081 from land transportation between 1989 and 1993. Water transportation moved about 1,100 TEUs of the commodity in 1993, which were worth about $3.5 million. This represented a two percent market share for ocean transportation in 1993, out of the approximately 68,000 TEUs of animal feed moving south in all modes that year. It accounted for two percent of total southbound waterborne commerce in 1993, as well. There is also good potential for US companies for customized farm and ranch animal feeds because "...Mexico is a net importer of grain..." (Johns, 1995b, p. 2A). SITC 081 currently has good short-term potential for ocean transportation on the longer-hauls. This may even turn into a best-case commodity once the peso crisis is over.

SITC 744 (Mechanical Handling Equipment, & Pts Thereof, NES) is a smaller to medium-size commodity with positive proportionality and differential shifts. The commodity is growing rapidly on a trade-wide basis and ocean transportation is capturing cargo from other modes. It should be pursued by ocean carriers.

> Mexico's need to modernize its industry has directly resulted in Mexico's demand for foreign machinery and industrial equipment—equipment that it is incapable of manufacturing for itself (Manzella, 1994, p. 74).

Ocean transport captured 420 TEUs from air and land transportation between 1989 and 1993. It had a ten percent market share comprising over 1,000 TEUs in 1993, which were worth almost $27.7 million. SITC 744 grew at an overall average rate of 291 percent between 1989 and 1993, while almost 10,000 TEUs overall moved south in 1993. This is a smaller, but significant, pool of high-value cargo that includes forklifts and elevators. Ocean carriers should try to improve its share in this trade with aggressive marketing policies. Between 1989 and 1993, maritime transportation experienced a 571 percent average growth rate in SITC 744, while shipper recognition rapidly increased. Ocean carriers should take measures to reinforce this momentum. This commodity is also one of the 1993 top-twenty ocean transport export commodities by value.

SITC 641 (Paper And Paperboard) is a larger, rapidly growing commodity. This is evidenced by its positive total shift of over 46,000 TEUs. SITC 641 has positive proportionality and differential shifts, as well. Forest products are generally considered to be a principal Mexican import (Kent, 1992, p. 9). Much of this commodity consists of general consumer goods, which are viewed as having strong potential in Mexico (Journal Of Commerce, 1993, p. 4A). Thus, paper and paperboard should be aggressively pursued by

ocean carriers. Actually, kraft linerboard was one of the top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). Waterborne transportation captured SITC 641 from the air and land transport modes in the amount of over 550 TEUs between 1989 and 1993. It grew by an average overall rate of 522 percent over the same period. More than 72,000 TEUs of this commodity moved south in the US-Mexico trade during 1993 and ocean transportation had a one percent share of it. Over 990 TEUs of SITC 641 moved south by water in 1993, which were worth over $5.5 million. This mode experienced a 1,317 percent average growth rate in the commodity between 1989 and 1993, as well. SITC 641 accounted for two percent of all southbound waterborne cargo flows during 1993. Shipper recognition of ocean transportation is quite low in this commodity and will require substantial attention by carriers. Regardless, they should still aggressively pursue this high-growth cargo.

SITC 247 (Wood In The Rough Or Roughly Squared) is a smaller, fast-growth commodity with long-term cargo capture potential for ocean transportation. This commodity had an overall average growth rate of 470 percent between 1989 and 1993, as well as positive proportionality and differential shifts. This commodity is rapidly growing on a trade-wide basis.

> ...[T]he diverse businesses involved in the building materials industries should see growing opportunities south of the border for years to come. Some segments — like lumber — must educate

> Mexican builders about the advantages of their products before they will see dramatic increases (Taylor, 1993b, p. 15A).

Ocean transport captured significant amounts of SITC 247, amounting to over 760 TEUs between 1989 and 1993, from land transportation. Maritime transport hauled about 880 TEUs of this commodity in 1993, which represented a 4,305 percent increase over the 1989 figure of 20 TEUs. SITC 247 accounted for two percent of total southbound US-Mexico waterborne commerce during 1993. Over 7,500 TEUs of it moved south in the overall trade during 1993. Water transport had a 12 percent market share in 1993 worth over $2.2 million. This commodity has good, long-term growth potential and should be pursued by ocean carriers. There is a small, but increasingly significant, amount of SITC 247 moving south in the trade. It is subject to capture by carriers with the most effective marketing policies. Logs and lumber were actually top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). It has growing shipper recognition that should be further developed.

SITC 554 (Soap, Cleansing And Polishing Preparations) is a medium-size, fast-growing commodity that provides ocean carriers with a long-term potential opportunity. US household consumer goods are generally viewed as having strong potential in Mexico (Journal Of Commerce, 1993, p. 4A). It has a positive proportionality shift, but a negative differential shift. SITC 554's average growth rate was about 199 percent between 1989 and 1993. Ocean transportation,

however, lost 2,950 TEUs of this commodity to the air and land modes over this period. Only about 700 TEUs of SITC 554 moved by water in 1993, compared to 1,230 TEUs in 1989. Ocean transportation still had a three percent market share of this commodity during 1993, which was worth almost $2.5 million. SITC 554 made up two percent of total southbound waterborne commerce in 1993, as well. Over 24,300 TEUs of this commodity were moving south in the overall trade during 1993 and were available for capture. This is a significant amount of cargo, particularly since it is fast-growing. The Mexican Peso crisis is likely to slow it down, however, at least in the short-term. "The continuing fall of the peso has placed many U.S. products out of the reach of Mexican shoppers and is forcing large retailers to hold back trailerloads of consumer goods north of the border" (Johnson, 1995, p. 1A). Shipper recognition of water transport is presently quite low in SITC 554. The mode may not be meeting shipper needs where recognition does exist, as evidenced by the cargo loss. Regardless, ocean transportation has an opportunity to regain market share in a rapidly growing commodity by turning this loss around.

SITC 523 (Metallic Salts And Peroxysalts Of Inorganic Acids) is a larger commodity that has a negative proportionality shift, but a positive differential shift. This is a good, short-term opportunity for ocean transportation. SITC 523 is growing more slowly than the

trade-wide average due to exogenous factors. Nevertheless, ocean transportation captured over 570 TEUs from the land transport modes between 1989 and 1993. Ocean carriers hauled over 680 TEUs of this commodity in 1993, which were worth over $1.6 million. This accounted for one percent of all southbound waterborne commerce that year. Regardless, more than 47,600 TEUs of SITC 523 moved south in the US-Mexico trade during 1993. There is definitely a large pool of cargo available for capture. Much of it can also be moved by intermodal tank containers, which comprise a "...small, but growing, part of the U.S. chemical transportation industry" (Gottschalk, 1994, p. 5C). Ocean transportation had a one percent market share in SITC 523 during 1993 and a low, but rapidly improving, level of shipper recognition. Regardless, this is a slow-growth commodity that should be pursued only on a short-term basis.

SITC 112 (Alcoholic Beverages) is a smaller commodity that provides ocean carriers with a potential short-term opportunity. Beverages of all kinds are generally viewed as having good future prospects in Mexico (Kent, 1992, p. 9). This commodity is also one of the 1993 top-twenty oceanborne export cargoes by value. SITC 112 has a negative proportionality shift, but a positive differential shift. It is growing slower than the trade-wide average, but is being captured by ocean transportation. This mode gained over 550 TEUs of alcoholic beverages from the air and land modes

between 1989 and 1993. About 660 TEUs of SITC 112 moved south by water in 1993, compared to 50 TEUs in 1989. Ocean transportation had a solid nine percent market share of this commodity in 1993, which was worth over $5.1 million. SITC 112 accounted for one percent of all southbound waterborne commerce in 1993. Only about 7,500 TEUs of this commodity, however, were exported to Mexico trade-wide during 1993. It will also become more expensive to Mexican consumers due to the peso crisis. They may just purchase the less-expensive domestic brands of beer, for example, instead of US exports. Monterrey should benefit from the crisis, however, since it has the largest brewing industry in Mexico (Hall, 1994o, p. 8A). Shipper recognition of ocean transportation is relatively good in SITC 112. Regardless, this is a slow-growth commodity and should only be pursued by ocean carriers on a short-term basis.

SITC 574 (Polyacetals Etc., Epoxide Resins Etc., Primary Forms) is a larger, rapidly growing commodity. This is evidenced by its positive total shift of over 31,000 TEUs. Resins were one of the top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). SITC 574 has positive proportionality and differential shifts. It should definitely be aggressively pursued by ocean carriers as a best case scenario. Much of this cargo can also be moved by intermodal tank containers, which comprise a "...small, but growing, part of the U.S. chemical

transportation industry" (Gottschalk, 1994, p. 5C). Between 1989 and 1993, water transport captured over 440 TEUs of this commodity from land transportation. SITC 574 grew by an average overall rate of 900 percent over the same period. More than 40,000 TEUs of it moved south in the US-Mexico trade during 1993. Ocean transportation had a one percent share of the commodity's 1993 total export trade. Over 540 TEUs of SITC 574 moved south by water in 1993, which were worth over $1.4 million. The mode also experienced a 5,340 percent average growth rate between 1989 and 1993 in this commodity. SITC 574 accounted for one percent of all southbound waterborne cargo flows in 1993. Shipper recognition of ocean transportation is quite low in this commodity, but is nevertheless improving. Carriers should take action to enhance this growing awareness. It is a top-twenty total weight shift cargo, as well, which indicates rapid growth.

SITC 571 (Polymers Of Ethylene, In Primary Forms) is a medium to larger-size, short-term alternative for ocean transportation. It has a negative proportionality shift, but a positive differential shift. Carriers may want to maximize any benefits left in this commodity by adopting short-term policies designed to capture remaining market share. Much of this cargo can also be moved by intermodal tank containers, which comprise a "...small, but growing, part of the U.S. chemical transportation industry" (Gottschalk, 1994, p. 5C).

SITC 571 is growing more slowly than the trade-wide average due to exogenous factors. The Mexican Peso crisis will probably hinder any growth even further, at least in the short-term. Ocean transport captured more than 260 TEUs of SITC 571 from land transportation between 1989 and 1993. Water transportation moved about 420 TEUs of this commodity in 1993, which were worth about $3.2 million. This represented a two percent market share for ocean transportation that year. Approximately 28,000 TEUs of ethylene polymers moved south in all modes during 1993. SITC 571 also accounted for one percent of total southbound waterborne commerce that year. The commodity should be pursued by ocean carriers only on a short-term basis due to its slow-growth characteristics.

SITC 679 (Iron & Steel Tubes, Pipes & Hollow Profiles, Fittings) is a smaller commodity with good, long-term cargo capture potential for ocean transportation. This commodity had an overall average growth rate of 294 percent between 1989 and 1993 with a positive proportionality shift. SITC 679 is rapidly growing on a trade-wide basis.

> Mexico is one of the few countries with which the United States has a surplus in the steel trade. Generally, U.S. mills export to Mexico higher-valued or specialized steel products, while Mexico exports lower-end steel products. Mexico must [also] import steel for its massive infrastructure development program. Economists project Mexico will spend from $20 billion to $50 billion for new roads, bridges, border crossings, etc., by the year 2010 (Mongelluzzo, 1995, p. 3A).

Nevertheless, this commodity has a negative differential shift. Ocean transport lost about 100 TEUs of SITC 679 to land modes between 1989 and 1993. Maritime transportation hauled about 370 TEUs of it in 1993, which represented a 209 percent increase over the 1989 figure of 120 TEUs. SITC 679 accounted for one percent of total southbound US-Mexico waterborne commerce during 1993. Over 7,100 TEUs of this commodity moved south in the overall trade that year. Water transport had an five percent share of SITC 679 in 1993 worth over $5.4 million. This commodity has good, long-term growth potential and ocean carriers should try to pursue it by first stopping the cargo loss. There is a smaller, but significant amount of SITC 679 moving south in the trade. Ocean transportation also has limited shipper recognition in this commodity that needs to be further developed. The peso devaluation, however, will probably slow its growth. Regardless, "Mexico's current financial crisis is viewed by steel traders as a temporary setback to what has been a healthy two-way trade in steel products" (Mongelluzzo, 1995, p. 3A). This commodity is still a 1993 top-twenty oceanborne export cargo by value.

SITC 111 (Non-Alcoholic Beverages) is a medium-size, rapidly growing commodity. This is evidenced by its positive total shift of over 15,000 TEUs. Beverages of all kinds are generally viewed as having strong potential in Mexico (Kent, 1992, p. 9). It has a positive proportionality shift, but a

negative differential shift. Thus, it is a long-term potential commodity for maritime transportation. Both air and land transportation are capturing cargo from ocean transport, which lost over 500 TEUs between 1989 and 1993. Nevertheless, SITC 111 grew by an average rate of 1,759 percent between 1989 and 1993. There were over 17,100 TEUs of it moving south in the US-Mexico trade during 1993. Ocean transportation, however, had only a one percent share of the commodity's 1993 total export trade. Waterborne market share consisted of 216 TEUs in 1993, which were worth about $900,000. This commodity accounted for less than one percent of total southbound waterborne cargo flows in 1993. Ocean carriers should stop the cargo loss and market their services more aggressively to begin recapturing this strong commodity. It is also a top-twenty total weight shift cargo, which indicates rapid growth. A short-term problem, however, is that "...[t]he continuing fall of the peso has placed many U.S. products out of the reach of Mexican shoppers and is forcing large retailers to hold back trailerloads of consumer goods north of the border" (Johnson, 1995, p. 1A). Shipper recognition of ocean transport services is also low in SITC 111. This will make it harder for waterborne carriers to regain market share.

Export Analysis By Total Weight Shift

This portion of the detailed shift-share analysis assessed the top-twenty export commodities with the highest total weight shifts. See Tables 11 and 12. This was done to reveal high-growth commodities having good potential for capture by maritime transportation over the long-term. These are all fast-growth cargoes, as indicated by their positive total shifts. All exports on this list moved in trade-wide amounts exceeding 6,000 TEUs (or 500 TEUs per month) during 1993, which was the imposed cutoff figure. See Table 12. Six of the commodities on Table 11, however, were already analyzed in the preceding section as 1993 top-twenty vessel weight cargoes. See Table 9, p. 260. These commodities were noted below and excluded from further discussion, in this section only, to avoid duplication: SITCs 641, 574, 642, 516, 111, and 597. All remaining commodities were analyzed according to the shift-share logic described in the methodology. See Shift-Share Scenarios, p. 69. Also, see United Nations (1986) for a five-digit subdivision of all commodities included in this part of the three-digit analysis.

SITC 773 (Equipment For Distributing Electricity, NES), is a medium to larger-size, very fast-growing commodity with good cargo capture potential for ocean transport. This is only true, however, for shipments not moving in the maquiladora trade. This commodity had a positive total shift

TABLE 11

SHIFT-SHARE BASE OUTPUT: EXPORTS
(LISTED BY TOTAL WEIGHT SHIFT-ALL MODES)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
641	70	992	1317%	*OCEAN*	87	279	556	835
				AIR	37	120	-142	-22
				LAND	14,219	45,788	-414	45,374
				ALL				46,187
574	10	544	5340%	*OCEAN*	12	78	444	521
				AIR	0	1	1	2
				LAND	4,939	30,977	-445	30,532
				ALL				31,055
642	170	1,433	743%	*OCEAN*	210	148	904	1,052
				AIR	74	52	-100	-47
				LAND	43,292	30,378	-805	29,574
				ALL				30,579
773	0	12	NEW	*OCEAN*	0	7	6	12
				AIR	25	1,305	-1,320	-14
				LAND	553	29,166	1,314	30,480
				ALL				30,478
012	0	140	NEW	*OCEAN*	0	0	140	140
				AIR	0	13,809	-13,798	10
				LAND	0	13,809	13,658	27,467
				ALL				27,617
516	1,030	21,669	2004%	*OCEAN*	1,275	1,507	17,857	19,364
				AIR	0	0	7	7
				LAND	18,218	21,531	-17,864	3,667
				ALL				23,038
057	20	127	535%	*OCEAN*	25	196	-114	82
				AIR	12	98	-120	-22
				LAND	2,262	17,928	235	18,163
				ALL				18,223
784	20	15	-25%	*OCEAN*	25	15	-45	-30
				AIR	260	159	-416	-256
				LAND	24,479	14,988	461	15,449
				ALL				15,163
111	40	216	440%	*OCEAN*	50	654	-528	126
				AIR	0	0	4	4
				LAND	1,089	14,388	524	14,912
				ALL				15,042
581	0	109	NEW	*OCEAN*	0	0	109	109
				AIR	12	14,400	-14,418	-18
				LAND	0	144	14,310	14,454
				ALL				14,545

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
641	PAPER AND PAPERBOARD
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
773	EQUIPMENT FOR DISTRIBUTING ELECTRICITY, NES
012	MEAT NES & EDIBLE OFFAL, FRSH, CHLD, FROZ
516	ORGANIC CHEMICALS, NES
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
784	PARTS AND ACCESSORIES OF MOTOR VEHICLES, ETC.
111	NON-ALCOHOLIC BEVERAGES, NES
581	TUBES, PIPES AND HOSES OF PLASTICS

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 11
(CONTINUED)

SHIFT-SHARE BASE OUTPUT: EXPORTS
(LISTED BY TOTAL WEIGHT SHIFT-ALL MODES)

TOP-TWENTY COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
022	0	71	NEW	*OCEAN*	0	0	71	71
				AIR	0	0	4	4
				LAND	0	13,429	-75	13,354
				ALL				13,429
582	0	41	NEW	*OCEAN*	0	15	26	41
				AIR	25	3,023	-3,020	3
				LAND	83	10,127	2,994	13,121
				ALL				13,165
776	0	7	NEW	*OCEAN*	0	2	4	7
				AIR	37	724	-764	-40
				LAND	613	11,962	760	12,722
				ALL				12,689
597	10	1,274	12640%	*OCEAN*	12	130	1,122	1,252
				AIR	0	1	9	10
				LAND	1,077	11,272	-1,131	10,141
				ALL				11,403
263	110	5	-95%	*OCEAN*	136	375	-616	-241
				AIR	0	0	3	3
				LAND	3,090	8,515	613	9,129
				ALL				8,891
656	0	23	NEW	*OCEAN*	0	0	23	23
				AIR	25	8,371	-8,391	-20
				LAND	0	42	8,368	8,410
				ALL				8,413
749	0	18	NEW	*OCEAN*	0	17	1	17
				AIR	12	1,657	-1,668	-11
				LAND	46	6,164	1,668	7,832
				ALL				7,838
211	0	9	NEW	*OCEAN*	0	7	2	8
				AIR	12	668	-689	-21
				LAND	124	6,684	687	7,371
				ALL				7,358
713	30	31	3%	*OCEAN*	37	84	-119	-36
				AIR	74	167	-255	-87
				LAND	3,107	6,989	374	7,362
				ALL				7,239
892	10	83	730%	*OCEAN*	12	40	21	60
				AIR	124	398	-401	-3
				LAND	1,896	6,094	380	6,474
				ALL				6,531

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
582	PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
263	COTTON TEXTILE FIBERS
656	TULLES, LACE, EMBROIDERY, RIBBONS, TRIMMINGS, ETC.
749	NONELECTRIC PARTS & ACCESSORIES OF MACHINERY NES
211	HIDES & SKINS (EXCEPT FURSKINS), RAW
713	INTERNAL COMBUSTION PISTON ENGS, AND PTS, NES
892	PRINTED MATTER

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 12

KEY ATTRIBUTES OF TOP-TWENTY TOTAL WEIGHT SHIFT-ALL MODES EXPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
*641	11,586	1%	72,116	1%	1%	2%	1,100,000	5,504,000	*400%*
574	4,000	<1%	40,008	1%	<1%	1%	100,000	1,441,000	*1341%*
*642	35,201	<1%	109,356	1%	1%	3%	2,100,000	8,641,000	*311%*
773	467	<1%	31,523	<1%	<1%	<1%	200,000	534,000	*167%*
012	0	N/A	27,618	1%	N/A	<1%	0	1,313,000	*NEW*
*516	15,747	7%	58,278	37%	8%	45%	5,900,000	59,331,000	*906%*
057	1,858	1%	22,379	1%	<1%	<1%	400,000	750,000	*88%*
784	20,004	<1%	59,930	<1%	<1%	<1%	2,000,000	1,066,000	*-47%*
111	920	4%	17,101	1%	<1%	<1%	200,000	880,000	*340%*
581	10	N/A	14,566	1%	N/A	<1%	0	843,000	*NEW*

$ = US Dollars
% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)
** = Top-Twenty 1993 Vessel Value And Top-Twenty Total Weight Shift Commodity*

SITC	COMMODITY LIST
641	PAPER AND PAPERBOARD
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
773	EQUIPMENT FOR DISTRIBUTING ELECTRICITY, NES
012	MEAT NES & EDIBLE OFFAL, FRSH, CHLD, FROZ
516	ORGANIC CHEMICALS, NES
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
784	PARTS AND ACCESSORIES OF MOTOR VEHICLES, ETC.
111	NON-ALCOHOLIC BEVERAGES, NES
581	TUBES, PIPES AND HOSES OF PLASTICS

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 12
(CONTINUED)

KEY ATTRIBUTES OF TOP-TWENTY TOTAL WEIGHT SHIFT-ALL MODES EXPORT COMMODITIES

THREE-DIGIT SITC	1989 TOTWT BY SITC (TEUs)	1989 VSL MARKET SHARE	1993 TOTWT BY SITC (TEUs)	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC ($)	1993 VSLVAL BY SITC ($)	VESSEL VALUE CHANGE
022	0	N/A	13,429	1%	N/A	<1%	0	983,000	*NEW*
582	87	<1%	13,360	<1%	<1%	<1%	300,000	1,222,000	*307%*
776	526	<1%	13,865	<1%	<1%	<1%	100,000	504,000	*404%*
*597	880	1%	13,373	10%	<1%	3%	400,000	6,480,000	*1520%*
263	2,606	4%	14,723	<1%	1%	<1%	1,300,000	72,000	*-94%*
656	20	N/A	8,458	<1%	N/A	<1%	0	161,000	*NEW*
749	47	<1%	7,944	<1%	<1%	<1%	200,000	296,000	*48%*
211	110	<1%	7,605	<1%	<1%	<1%	100,000	119,000	*19%*
713	2,600	1%	13,058	<1%	<1%	<1%	5,500,000	2,115,000	*-62%*
892	1,642	1%	10,206	1%	<1%	<1%	500,000	1,959,000	*292%*

$ = US Dollars
% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)
** = Top-Twenty 1993 Vessel Value And Top-Twenty Total Weight Shift Commodity*

SITC	*COMMODITY LIST*
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
582	PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
263	COTTON TEXTILE FIBERS
656	TULLES, LACE, EMBROIDERY, RIBBONS, TRIMMINGS, ETC.
749	NONELECTRIC PARTS & ACCESSORIES OF MACHINERY NES
211	HIDES & SKINS (EXCEPT FURSKINS), RAW
713	INTERNAL COMBUSTION PISTON ENGS, AND PTS, NES
892	PRINTED MATTER

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

of over 30,500 TEUs. It also had a tremendous overall average growth rate of 6,650 percent between 1989 and 1993. After two years of promises, Mexico recently announced it was opening Mexican power generation to foreign investors. It is doing so in an effort to raise urgently needed capital following the peso devaluation. The Mexican government, however, will retain control over transmission and distribution (Hall, 1995c, p. 7B). Power plant privatization should drastically improve demand for SITC 773. This commodity has positive proportionality and differential shifts. SITC 773 is fast-growing on a trade-wide basis and maritime transport captured six TEUs from air transportation between 1989 and 1993. Only about 12 TEUs of this commodity, worth $534,000, moved by water in 1993. This is a new cargo to maritime transportation, since 1989, and accounted for a negligible share of the mode's total US export commerce to Mexico in 1993. Marine transportation's market share in SITC 773 was also negligible that year, out of an overall amount of more than 31,500 TEUs moving south on a trade-wide basis. Substantial amounts of SITC 773 are available for capture and carriers should adopt sound marketing policies to expand their market share.

> You still have a [US-Mexico] market that's growing. On the industrial side of things, if Mexico is going to buy new technologies they're going to have to computerize, and it will require a lot more power (Hall, 1995c, p. 7B).

Nevertheless, much of this commodity may be moving in the maquiladora trade. Ocean transportation cannot effectively compete for such cargo. The Mexican Peso crisis will probably make SITC 773 more expensive to Mexican buyers and hinder short-term growth. Ocean transportation has very poor shipper recognition in this commodity and should take measures to improve it. Carriers should pursue the longer-haul shipments and try to increase their negligible share of SITC 773 wherever possible. According to the former-Mexican Energy Minister Emilio Lozoya, "[o]ver the next 14 years, Mexico would need 40 new thermoelectric plants with an average size of 400 megawatts" (Hall, 1995c, p. 7B). Ocean carriers could transport equipment for distributing electricity, as well as any other electrical or construction equipment, to many locations throughout Mexico. It could do so far more efficiently, particularly in the southern regions of Mexico, than trucking, rail or air. There are many other planned or ongoing Mexican infrastructure upgrade projects that ocean carriers should investigate for potential cargoes, as well.

SITC 012 (Meat NES & Edible Offal, Frsh, Chld, Froz), has positive proportionality and differential shifts. It is growing faster than the trade-wide average, as evidenced by its positive total shift of over 27,600 TEUs. This medium to larger-size commodity is new to maritime transportation since 1989 and is a best-case scenario. New container technology

allows water transportation to more effectively compete for perishables, such as meat. "Livestock products are another opportunity, as Mexicans are major consumers of pork" (Fraser, 1992, p. 88). Demand for US turkey is also tremendous in Mexico as an inexpensive source of meat. US producers view Mexico as their top export market (Burrows, 1994a, p. 56). Aside from this, however, the peso crisis is having a negative short-term impact on the commodity. "Exporters of U.S. beef estimate their shipments to Mexico have fallen 70% to 80% since the Mexican government devalued their currency on Dec. 20 [1994]" (Johnson, 1995, p. 3A). Regardless, ocean transport captured 140 TEUs from air transportation between 1989 and 1993. Ocean transport handled over 140 TEUs of SITC 012 in 1993, which were worth over $1.3 million. This commodity moved south in an overall amount of over 27,600 TEUs during 1993. Nevertheless, it accounted for only a negligible share of all waterborne general cargo exports that year. Ocean transportation had a one percent market share in SITC 012 during 1993. There is another isolated development that could negatively affect maritime transportation's ability to compete for this cargo. "Since 1991, Mexican turkey buyers have built a solid infrastructure of refrigerated warehouses on the U.S.-Mexico border to serve as distribution centers into the Mexican interior" (Burrows, 1994a, p. 56). This network would probably rely on trucking and rail instead of ocean and air

transport services. Shipper recognition in SITC 012 is quite low, but improving, in regard to waterborne transportation. Ocean carriers should take aggressive action to capture more of this commodity and increase shipper recognition, particularly with longer-haul shipments.

SITC 057 (Fruit, Nuts (Not Including Oil Nuts) Fresh Or Dried) is a medium-size commodity that has a positive proportionality shift, but a negative differential shift. SITC 057 grew at an average rate of 1,104 percent between 1989 and 1993. It has good, long-term potential for maritime transportation. New container technology allows ocean carriers to more effectively compete for perishables, such as fruit. Waterborne commerce lost 114 TEUs of this commodity to land transportation between 1989 and 1993. Ocean transport moved only 127 TEUs of it during 1993, which were worth $750,000. Maritime transportation still experienced a 535 percent average growth rate in SITC 057 between 1989 and 1993. Regardless, it had only a one percent share of this commodity in 1993, which accounted for a negligible percent of total waterborne exports that year. Over 22,300 TEUs of SITC 057 moved south in the overall US-Mexico trade during 1993.

> The sheer size of the just south-of-the-border food market, and the expected sustained medium- and long-term growth of Mexico's economy, has agricultural experts looking past problems linked to the recent devaluation of the Mexican peso (Johns, 1995a, p. 3A).

Several sectors of the US fruit and nut export sector are booming in Mexico. They include table grapes, pears, apples, and almonds. "Mexico spent $11.8 million on purchases of U.S. shelled almonds in 1994, and $421,000 on almonds in the shell" (Johns, 1995d, p. 3A). In the fruit sector, "Mexico has emerged as the largest importer of U.S. apples and pears in recent years." The Mexican Port of Manzanillo, which has refrigerated facilities, was the main port of entry for Washington apples until recent schedule conflicts in Ecuador forced Dole Ocean Liner Express to terminate service to the port. Pacific Northwest apple growers are currently seeking another carrier to fill the void. "Moving the fruit by sea saves about 30 cents on each apple carton, compared with the trucking cost" (DiBenedetto, 1994, pp. 1A and 8A). Also, the Port of Manzanillo has good highway connections to Mexico City and Guadalajara, as well as a hinterland of 45 million consumers (Brennan, 1994, n.p.). Another development affecting SITC 057 is that US producers of plums, peaches, and nectarines may be able to export their produce to Mexico within the next few years. They are currently restricted from the Mexican market in retaliation for a US quarantine against Mexican avocados. US avocado growers are under increasing pressure to abandon this pest quarantine, which is widely seen as a disguised trade barrier that is hurting other US growers (Johns, 1995c, pp. 1A and 8A). Ocean carriers should aggressively pursue SITC 057, particularly

the longer-haul shipments. They also need to provide better service to the shippers they already have, which could be a factor in the negative differential shift. Rising freight rates resulting from the peso crisis, however, could diminish Mexican importer demand for US fruit in the short-term (DiBenedetto, 1994, p. 8A).

SITC 784 (Parts And Accessories Of Motor Vehicles, Etc.) is a large, fast-growth export commodity with good, long-term potential for ocean transportation. The peso crisis, however, has all but stopped the short-term trade in auto parts (Hall, 1995d, p. 1A). Nevertheless, it had an overall average growth rate of 200 percent between 1989 and 1993 and moved south in amounts of nearly 60,000 TEUs during 1993.

> Automobiles-and-parts trade accounts for one-fifth of trade between the United States and Mexico, and is expected to grow as Mexico removes tariffs and other barriers to trade (Maggs, 1992, p. 11C).

SITC 784 has a positive proportionality shift, but a negative differential shift. Maritime transport lost 45 TEUs to land modes in 1993. Moreover, ocean transportation moved only 15 TEUs of this cargo in 1993, which were worth over $1 million. Only a negligible share of SITC 784 moved by water in 1993 and accounted for less than one percent of ocean transport's total southbound cargo flows that year. Maritime transportation has minimal shipper recognition with this commodity. The major problem with SITC 784 is that much of it is probably maquiladora commerce. Ocean transportation cannot effectively compete in this trade. Nevertheless, any

SITC 784 cargo moving farther south would be a good target for capture and should be pursued by the mode.

SITC 581 (Tubes, Pipes And Hoses Of Plastics) is a smaller to medium-size commodity that is a good alternative for ocean transportation. This commodity has positive proportionality and differential shifts. Plastics were actually one of the top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). This commodity is new to maritime transportation since 1989 and is growing extremely fast on a trade-wide basis. It grew by a tremendous 145,560 percent between 1989 and 1993 due to exogenous factors. Mexican public and private infrastructure upgrade programs are generating strong demand for this commodity (Journal Of Commerce, 1994e, p. 8A). This is evidenced by its positive total shift of over 14,500 TEUs. More than 14,500 TEUs of SITC 581 moved south overall in 1993, compared to cargo flows of only 10 TEUs overall in 1989. Moreover, ocean transport captured more than 100 TEUs of this commodity from air transportation between 1989 and 1993. Nevertheless, water transportation moved only about 110 TEUs of it during 1993, which were worth roughly $840,000. This represented a one percent market share for ocean transportation in 1993 and a negligible share of 1993 total waterborne export commerce. SITC 581 should definitely be pursued by ocean carriers, even though the mode has a small market share at this time. Shipper recognition, in

regard to ocean transportation, is also limited with this commodity. Nevertheless, it is slowly improving and aggressive marketing policies should be adopted to accelerate cargo capture. The Mexican Peso crisis, however, may slow SITC 581's very fast-growth in the short-term.

SITC 022 (Milk, Cream, Milk Products Except Butter Or Cheese), should be pursued by ocean carriers due to its smaller, but strong, long-term growth characteristics and good cargo capture potential. The US actually exported over 50 million liters of milk and cream to Mexico in 1993 (Johns, 1995b, p. 1A). This smaller to medium-size commodity was new to the US export trade to Mexico, since 1989, while more than 13,400 TEUs of SITC 022 moved south in 1993. It has positive proportionality and differential shifts. SITC 022 is a new and very fast-growing commodity on a trade-wide basis. Ocean carriers should further develop this promising commodity.

> Currently, less than 2% of the U.S. dairy production is sold overseas. But products with a longer shelf life, such as powdered milk, butter and cheese are exported. Mexico is a growing market for those products because much of the country is either too hot or humid for wide-scale milk production. Moreover, Mexico is a net importer of grain, making its feed costs relatively high (Johns, 1995b, p. 2A).

Maritime transport captured over 70 TEUs from land transportation between 1989 and 1993. Only 71 TEUs of this commodity, worth about $980,000, moved by water in 1993. The mode's 1993 market share was about one percent and accounted for only a negligible share of water transport's overall

export commerce during 1993. Small, but rapidly growing, amounts of SITC 022 are nevertheless available for capture and carriers should adopt aggressive marketing policies to expand their market share. New container technology allows ocean transportation to more effectively compete for perishables, such as milk. The Mexican Peso crisis, however, will probably make it more expensive for the Mexican consumer and hinder short-term growth. Ocean transportation has small, but improving, shipper recognition in SITC 022 that should be developed further.

SITC 582 (Plates, Sheets, Film, Foil & Strip, Of Plastics) is a smaller to medium-size, very rapidly growing commodity with positive proportionality and differential shifts. Plastics were actually one of the top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). SITC 582 is growing rapidly on a trade-wide basis and ocean transportation is capturing it from other modes. This commodity will be needed for Mexico's extensive public and private sector upgrade projects (Journal Of Commerce, 1994e, p. 8A). Ocean transportation captured 26 TEUs from air transport between 1989 and 1993. Water transport had a negligible market share comprised of only 41 TEUs in 1993, which were worth over $1.2 million. SITC 582 grew at an overall average rate of 15,256 percent between 1989 and 1993, while over 13,300 TEUs moved south in 1993. This is a smaller, but significant pool of cargo. Ocean

carriers should try to improve their position in this trade with aggressive marketing policies. SITC 582 is actually new to maritime transportation since 1989. Ocean transport shipper recognition is small, but improving in this commodity and carriers should take action to expand it. The peso crisis, however, will probably slow its growth in the short-term.

SITC 776 (Thermionic, Cold Cathode, Photo-Cathode Valves Etc.) is a smaller to medium-size, high-growth alternative for ocean transportation. It has positive proportionality and differential shifts. This commodity is new to maritime transportation since 1989 and is rapidly growing on a trade-wide basis. It grew at an average overall rate of 2,536 percent between 1989 and 1993. Even though trade in this commodity was booming in 1994, the Mexican Peso crisis will probably slow its growth in non-maquiladora traffic, at least in the short-term (Journal Of Commerce, 1994e, p. 8A). Ocean transportation captured four TEUs of SITC 776 from air transport between 1989 and 1993. Water transportation moved only seven TEUs of the commodity in 1993, which were worth about $504,000. This represented a negligible market share for ocean transport out of the approximately 13,800 TEUs moving south in all modes that year. SITC 776 accounted for a negligible share of total southbound waterborne commerce in 1993, as well. Since much of this commodity probably consists of maquiladora commerce, only portions moving in

other trades should be pursued by ocean carriers. Shipper recognition of maritime transportation is minimal in SITC 776. Nevertheless, it is a high-growth commodity with a growing pool of cargo available for capture.

SITC 263 (Cotton Textile Fibers) is a smaller to medium-size, rapidly growing commodity with a positive proportionality shift, but a negative differential shift. Textiles are generally viewed as a primary export to Mexico (National Trade Data Bank, 1994b, CD-ROM). Raw cotton and rough fabric were actually on the top-five US containerized exports to Latin America list in 1992 (Traffic World, 1993, p. 20). The peso crisis will probably hurt its growth in the short-term. SITC 263 has only smaller, long-term potential for ocean transportation. The commodity is growing rapidly on a trade-wide basis, at an average 465 percent between 1989 and 1993. Ocean transportation, however, is losing it to other modes. Carriers may wish to pursue SITC 263, but should not target maquiladora cargoes. Maritime transport lost over 600 TEUs to air and land transportation between 1989 and 1993. It had a negligible market share in 1993, which worth only $72,000. Nevertheless, over 14,700 TEUs of SITC 263 moved south overall in 1993. This is a smaller, but significant, pool of cargo. Ocean transport shipper recognition, however, is very poor in this commodity. It is possible that ocean carriers are not meeting shipper needs, as evidenced by the negative differential shift. Conversely,

other modes simply may have better marketing strategies. Carriers should take measures to stop the loss of cargo and begin recapturing market share.

SITC 656 (Tulles, Lace, Embroidery, Ribbons, Trimmings, Etc.) is a smaller, rapidly growing commodity that is new to ocean transportation since 1989. It has positive proportionality and differential shifts. Ocean carriers may wish to pursue it further. Water transport captured 23 TEUs of this commodity from air transportation between 1989 and 1993. SITC 656 grew by an average overall rate of 42,190 percent over the same period, while more than 8,400 TEUs of this commodity moved south overall during 1993. Ocean transportation, however, had a negligible share of the commodity's total 1993 export trade. Only about 23 TEUs of SITC 656 moved south by water in 1993, which were worth over $161,000. This commodity accounted for a negligible share of total southbound waterborne cargo flows in 1993, as well. Shipper recognition of ocean transportation is quite low, but slowly improving, in the commodity. Carriers may wish to adopt the necessary policies to gain a larger share of this cargo, provided they avoid maquiladora commerce.

SITC 749 (Nonelectric Parts & Accessories Of Machinery NES) is a smaller commodity with fast-growth characteristics and some limited cargo capture potential for ocean transportation. Mexico needs these parts to upgrade its industrial sector (Manzella, 1994, p. 74). This commodity is

new to maritime transportation since 1989. It had an overall average growth rate of 16,802 percent between 1989 and 1993. SITC 749 also has positive proportionality and differential shifts. It is rapidly growing on a trade-wide basis, even though ocean transport captured only one TEU of SITC 749 from air transportation between 1989 and 1993. Water transport hauled only 18 TEUs of this commodity in 1993, which were worth $296,000, and accounted for a negligible share of total southbound US-Mexico waterborne commerce that year. Over 7,900 TEUs of this commodity moved south in the overall trade during 1993 and ocean transportation had only a negligible market share. This commodity has some promise for ocean carriers, but should only be pursued as long it is not maquiladora industry commerce. There is a small, but significant, amount of SITC 749 moving south that is subject to capture. Shipper recognition, however, is minimal for ocean transport in this commodity.

SITC 211 (Hides & Skins (Except Furskins), Raw) is a smaller, fast-growing commodity that provides ocean carriers with a limited opportunity for cargo capture. This commodity probably consists of primary inputs for maquiladora and Mexican domestic industries. It has positive proportionality and differential shifts. SITC 211's growth rate averaged 6,814 percent between 1989 and 1993. Ocean transport captured only two TEUs of this commodity from air transportation over the same period. About ten TEUs of SITC

211 moved by water in 1993, probably because it is new to maritime transportation since 1989. Ocean transport had a negligible share of this commodity in 1993, which was worth about $120,000. SITC 211's share of total southbound waterborne commerce was also negligible that year, while about 7,600 TEUs of it moved south in the overall trade. This is a smaller, but significant amount of cargo, particularly since it is fast-growing. The Mexican Peso crisis, however, is likely to cause this to slow, at least in the short-term. Shipper recognition of ocean transportation is also quite low in SITC 211. Regardless, it is an opportunity for carriers to gain some market share in a rapidly growing commodity, provided it is not maquiladora commerce.

SITC 713 (Internal Combustion Piston Engs, And Pts, NES) is a smaller to medium-size, fast-growth commodity that has long-term potential for ocean transportation. "Automobiles and related products are the largest component of bilateral trade ...between the United States and Mexico" (Manzella, 1994, p. 64). The Mexican Peso crisis, however, has all but stopped trade in this commodity, at least in the short-term (Hall, 1995c, p. 1A). It has a positive proportionality shift, but a negative differential shift. SITC 713 is growing faster than the trade-wide average at a rate of 402 percent, but ocean transport is losing it to other modes. Waterborne transportation lost almost 120 TEUs of engines and

parts to land transportation between 1989 and 1993. Ocean carriers hauled over 30 TEUs of the commodity in 1993, which were worth over $2.1 million. This accounted for a negligible share of total southbound waterborne commerce in 1993. Regardless, more than 13,000 TEUs of SITC 713 moved south in the US-Mexico trade during 1993. There is a decent pool from which to capture cargo. Ocean transportation, however, had a negligible 1993 share in this commodity and a worsening level of shipper recognition. Carriers are either not meeting shipper needs or are simply losing market share because of superior marketing by land modes. Nevertheless, liner operators should stop the loss and try to recapture this cargo with appropriate marketing strategies.

SITC 892 (Printed Matter) is a smaller commodity that provides ocean carriers with an opportunity to capture limited amounts of a fast-growth cargo. Printing and publishing industry goods are generally viewed as primary exports to Mexico (National Trade Data Bank, 1994b, CD-ROM). SITC 892 has positive proportionality and differential shifts. It is growing faster than the trade-wide average, at a rate of about 522 percent between 1989 and 1993. Ocean transportation captured 21 TEUs of SITC 892 from air transportation and experienced a 730 percent increase in market share over the same period. Regardless, only about 80 TEUs of SITC 892 moved south by water in 1993 and the mode had a one percent market share worth about $2 million. This

commodity's share of total southbound waterborne commerce was negligible that year, even though about 10,200 TEUs of it moved south in the overall trade. The Mexican Peso crisis is likely to cause the growth in SITC 892 to slow, at least in the short-term. Shipper recognition of ocean transportation is low, but improving, in this commodity. Carriers should adopt the appropriate policies to enhance this momentum.

Export Analysis By Remainder 1993 Vessel Value

This section analyzed any 1993 top-twenty high-value oceanborne export commodities remaining from the previous two sections. See Tables 13 and 14. It was done to assess ocean transportation's areas of greatest activity by value in 1993 to reveal higher-valued, long-term growth commodities that had potential for capture by maritime transportation. Seven of the ten remaining export commodities by value on Table 13 moved in trade-wide amounts of less than 6,000 TEUs (or 500 TEUs per month) during 1993. This was the imposed low-end cutoff figure for the larger lots trade. They are listed below and were excluded from further consideration due to insufficient 1993 volumes: SITCs 591, 653, 553, 721, 743, 728, and 874. See Table 14. Although there were still thirteen other commodities on the original top-twenty ocean cargoes by value list, which is located in Appendix L on p. 392, ten of them were already eliminated or analyzed in the previous two sections of this chapter. They were not

TABLE 13

SHIFT-SHARE BASE OUTPUT: EXPORTS

(REMAINING HIGHEST VALUE OCEAN CARGOES LISTED BY 1993 VESSEL WEIGHT)

SUPPLEMENTAL COMMODITIES

3-DIGIT SITC	VSLWT 89 *(TEUs)*	VSLWT 93 *(TEUs)*	VSLWT CHANGE	TRANSP MODE	TDSHR *(TEUs)*	PROSFT *(TEUs)*	DIFSFT *(TEUs)*	TOTSFT *(TEUs)*
591	0	208	NEW	*OCEAN*	0	7	201	208
				AIR	12	662	-663	-1
				LAND	38	2,038	462	2,499
				ALL				2,706
821	70	182	160%	*OCEAN*	87	71	-46	25
				AIR	25	20	-43	-22
				LAND	6,719	5,468	88	5,557
				ALL				5,560
653	10	158	1480%	*OCEAN*	12	-11	147	136
				AIR	37	-34	6	-28
				LAND	1,108	-1,012	-153	-1,165
				ALL				-1,057
553	30	145	383%	*OCEAN*	37	208	-131	78
				AIR	50	278	-323	-45
				LAND	138	775	454	1,229
				ALL				1,262
893	10	145	1350%	*OCEAN*	12	7	116	123
				AIR	50	28	-61	-34
				LAND	7,205	4,055	-55	4,001
				ALL				4,090
741	90	144	60%	*OCEAN*	111	-82	25	-57
				AIR	37	-27	-8	-35
				LAND	5,839	-4,320	-17	-4,338
				ALL				-4,430
721	30	118	293%	*OCEAN*	37	-2	53	51
				AIR	12	-1	-17	-17
				LAND	1,151	-52	-36	-87
				ALL				-53
743	130	78	-40%	*OCEAN*	161	137	-350	-213
				AIR	37	32	-65	-33
				LAND	1,086	926	415	1,340
				ALL				1,094
728	150	63	-58%	*OCEAN*	186	-91	-182	-273
				AIR	25	-12	-9	-22
				LAND	3,610	-1,767	191	-1,576
				ALL				-1,871
874	20	10	-50%	*OCEAN*	25	-17	-18	-35
				AIR	62	-42	21	-21
				LAND	1,717	-1,167	-3	-1,170
				ALL				-1,226

Note: TEUs may not add due to rounding.
TEU = Twenty-foot Equivalent Unit (approx. 10 metric tons)
OCEAN = Ocean Transportation
AIR = Air Transportation
LAND = Truck & Rail Transportation (combined)

SITC	*COMMODITY LIST*
591	INSECTICIDES, DISINFECTANTS ETC., RETAIL PACKED ETC.
821	FURNITURE & PTS, BEDDING, MATTRESSES, ETC.
653	WOVEN FABRICS, MAN-MADE TEXT MAT (NOT NARROW OR SPEC FAB)
553	PERFUMERY, COSMETICS OR TOILET PREPS, EXCEPT SOAPS
893	ARTICLES, NES OF PLASTICS
741	HEATING & COOLING EQUIPMENT AND PTS THEREOF, NES
721	AGRICULTURAL MACHINERY (EXCL TRACTORS) & PARTS
743	PUMPS, AIR OR OTHER GAS COMPRESSORS AND FANS
728	MACHRY ETC. SPECIALIZED FOR PARTICULAR INDUSTRIES NES
874	MEASURING/CHECKING/ANALYZING & CONTROL INST & APPARAT NES

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

TABLE 14

KEY ATTRIBUTES OF SUPPLEMENTAL HIGHEST VALUE OCEAN EXPORT CARGOES LISTED BY 1993 VESSEL WEIGHT

THREE-DIGIT SITC	1989 TOTWT BY SITC *(TEUs)*	1989 VSL MARKET SHARE	1993 TOTWT BY SITC *(TEUs)*	1993 VSL MARKET SHARE	1989 VSLWT SHR OF TOT 1989 VSLWT	1993 VSLWT SHR OF TOT 1993 VSLWT	1989 VSLVAL BY SITC *($)*	1993 VSLVAL BY SITC *($)*	VESSEL VALUE CHANGE
*591	41	<1%	2,797	7%	<1%	<1%	100,000	3,921,000	*3821%*
*821	5,517	1%	17,906	1%	1%	<1%	3,000,000	7,195,000	*140%*
*653	935	1%	1,035	15%	<1%	<1%	1,400,000	25,231,000	*1702%*
*553	182	16%	1,668	9%	<1%	<1%	5,800,000	10,042,000	*73%*
*893	5,870	<1%	17,227	1%	<1%	<1%	600,000	6,829,000	*1038%*
*741	4,837	2%	6,395	2%	1%	<1%	5,100,000	9,330,000	*83%*
*721	970	3%	2,117	6%	<1%	<1%	2,200,000	5,140,000	*134%*
*743	1,037	13%	3,416	2%	1%	<1%	28,200,000	7,913,000	*-72%*
*728	3,086	5%	5,036	1%	1%	<1%	13,200,000	5,236,000	*-60%*
*874	1,457	1%	2,035	<1%	<1%	<1%	6,200,000	4,600,000	*-26%*

$ = US Dollars

% = Vessel Weight Percentage By SITC Of Total Weight In Each Commodity And Of Total Vessel Weight In Trade (rounded)

** = Top-Twenty 1993 Vessel Value Commodity Only*

SITC	COMMODITY LIST
591	INSECTICIDES, DISINFECTANTS ETC., RETAIL PACKED ETC.
821	FURNITURE & PTS, BEDDING, MATTRESSES, ETC.
653	WOVEN FABRICS, MAN-MADE TEXT MAT (NOT NARROW OR SPEC FAB)
553	PERFUMERY, COSMETICS OR TOILET PREPS, EXCEPT SOAPS
893	ARTICLES, NES OF PLASTICS
741	HEATING & COOLING EQUIPMENT AND PTS THEREOF, NES
721	AGRICULTURAL MACHINERY (EXCL TRACTORS) & PARTS
743	PUMPS, AIR OR OTHER GAS COMPRESSORS AND FANS
728	MACHRY ETC. SPECIALIZED FOR PARTICULAR INDUSTRIES NES
874	MEASURING/CHECKING/ANALYZING & CONTROL INST & APPARAT NES

Sources: US Department of Commerce (1989 & 1993b), United Nations (1986), and author's calculations

included here to avoid duplication. The highest-valued ocean cargoes from Appendix L were marked with asterisks on Table 10, p. 262 and Table 12, p. 287 (from the previous two sections), which indicates they were already analyzed. All twenty of these export commodities were at least reviewed, due to their high oceanborne cargo value, to determine their growth characteristics and amenability to further capture by the mode. They were included in the study because freight rates are based on the value of the commodity. Weight considerations, however, are far more important to waterborne commerce. Only the following top-twenty highest-value oceanborne export commodities remained for in-depth analysis in this section: SITCs 821, 893, and 741.

SITC 821 (Furniture & Pts, Bedding, Mattresses, Etc.) is a medium-size, fast-growing commodity that provides ocean carriers with a potential long-term opportunity. It has a positive proportionality shift, but a negative differential shift. This commodity is generally considered to be a principal US export to Mexico (National Trade Data Bank, 1994b, CD-ROM). SITC 821's growth rate averaged 225 percent between 1989 and 1993. Ocean transport, however, lost 46 TEUs of it to land modes over the same period. Nevertheless, about 180 TEUs of SITC 821 moved south by water in 1993, compared to 70 TEUs in 1989. Ocean transportation had a one percent market share of this commodity in 1993, which was worth almost $7.2 million. SITC 821's share of total

southbound waterborne commerce was negligible that year. Regardless, over 17,900 TEUs of it moved south in the overall trade during 1993. This is a significant amount of cargo, particularly since it is fast-growing. The Mexican Peso crisis is likely to cause this to slow, however, at least in the short-term. Although ocean transportation is losing market share to land transportation, this is an endogenous force that liner carriers can exert some control over. Shipper recognition of ocean transportation is presently low in SITC 821 and the mode may not be meeting shipper needs where it does exist. Regardless, it is an opportunity to regain market share in a small, but rapidly growing commodity. Carriers should stop the loss and try to recapture cargo with appropriate marketing policies.

SITC 893 (Articles, NES Of Plastics) is a medium-size commodity with positive proportionality and differential shifts. The commodity is growing rapidly on a trade-wide basis and maritime transportation is capturing cargo from other modes. Plastics were actually one of the top-five US containerized exports to Latin America in 1992 (Traffic World, 1993, p. 20). Ocean transport captured over 115 TEUs from the air and land modes between 1989 and 1993. It also had a one percent market share comprising over 145 TEUs in 1993, which were worth over $6.8 million. Ocean transportation is performing rather well in SITC 893, despite its small market share. SITC 893 grew at an overall average

rate of 193 percent between 1989 and 1993, while over 17,200 TEUs moved south in 1993. This is a significant pool of cargo. Ocean carriers should try to improve their share of this trade with aggressive marketing policies. They should target trade groups, such as the International Association Of Plastics Distributors or the Plastic Soft Materials Manufactures Association, to further increase market share. "Plastics are particularly popular with Mexicans because they are cheap and durable. Mexicans, however, tend to reuse returnable bottles and containers, potentially limiting consumption" (Breskin, 1992, p. 11C). Ocean transport actually experienced a tremendous 1,350 percent average growth rate between 1989 and 1993 in this cargo. Water transport shipper recognition is improving in SITC 893 and carriers should take action to enhance it. This commodity should definitely be pursued by ocean carriers because of its demonstrated high-growth characteristics well into 1994 (Journal Of Commerce, 1994e, p. 8A).

SITC 741 (Heating & Cooling Equipment And Pts Thereof, NES) is a smaller commodity with some short-term potential for ocean transportation. It has a negative proportionality shift, but a positive differential shift. SITC 741 is growing slower than the trade-wide average and the peso crisis may decrease this rate even further. Nevertheless, specialty construction equipment, such as air conditioning systems, have a chance to prosper in Mexico (Taylor, 1993b,

p. 15A). Ocean transportation captured 25 TEUs of this commodity from the air and land transport sectors between 1989 and 1993. Maritime transport handled about 145 TEUs of SITC 741 in 1993, which were worth over $9.3 million. It also had a two percent market share in this commodity during 1993, which accounted for a negligible share of total waterborne general cargo exports that year. Ocean carriers may want to develop short-term policies to try and capture the remainder of this cargo. This would be done to maximize any benefits left in the commodity. During 1993, SITC 741 moved south in overall amounts of roughly 6,400 TEUs. It should be considered as an alternative target on a short-term basis only. Carriers should avoid wasting limited resources on cargoes moving in the maquiladora trade because they could be put to better use elsewhere. The most desirable cargoes are still rapidly growing on a trade-wide basis.

Summary

This study did not distinguish between intermediate inputs, maquiladora industry commerce or general consumer goods. Ocean transport marketing staffs, however, would need to do so effectively utilize these results. It is also important for carriers to realize that, according to the US International Trade Commission, only 21 percent of all US exports to Mexico are re-exported to the US (Manzella, 1994, p. 33). This implies that not all trade in specific

commodities, such as photo-cathode valves and tubes, consists of maquiladora commerce. Ocean carriers need to determine the actual percentage that is moving in the border trade and focus marketing resources elsewhere, at least until the in-bond industry expands farther south into Mexico. The maritime transportation industry should also target high-growth commodities revealed in this chapter by focusing marketing resources on respective trade associations, individual shippers or consignees, and US State Trade Offices in Mexico that advise potential shippers from their respective states. See Encyclopedia Of Associations (1994a and 1994b) for a detailed listing of related trade associations and Hall (1995f) for US State Trade Offices in Mexico City. The Mexican Peso crisis will likely cause a slowdown in most of the export commodities analyzed in Chapter 6, at least in the short-term.

> The peso devaluation in December hurt the purchasing power of Mexican consumers for overseas products. As a result, imports of consumables and other goods have declined. That has been reflected in a decline in carrier volumes (Wastler, 1995, p. 1B).

The export commodities listed in this paragraph represent the largest, most attractive commodities for aggressive, long-term ocean transport marketing strategies, excluding maquiladora traffic. They are fast-growing on a trade-wide basis and are being captured by ocean carriers in either larger or smaller amounts. They moved in 1993 trade-wide volumes exceeding 20,000 TEUs and include: SITC 516

(Organic Chemicals, NES); SITC 634 (Veneers, Plywood, Particle Brd, Other Worked Wood NES); SITC 642 (Paper & Paperboard, Cut To Size Or Shape, Articles); SITC 641 (Paper And Paperboard); SITC 574 (Polyacetals Etc., Epoxide Resins Etc., Primary Forms); SITC 773 (Equipment For Distributing Electricity, NES); and SITC 012 (Meat NES & Edible Offal, Frsh, Chld, Froz).

The export commodities listed in this paragraph represent the best-case, but more limited, opportunities for ocean transportation. While water transport is capturing these fast-growth commodities from the competition, overall 1993 export volumes were less than 20,000 TEUs. Nevertheless, they are good targets for ocean carriers regardless of the lower total amounts hauled by water in 1993. NAFTA will probably accelerate their long-term growth, even though the peso crisis is negatively affecting them in the short-term. Thus, carriers should aggressively pursue most of these cargoes, excluding maquiladora commerce. They include: SITC 597 (Additives For Mineral Oils Etc., Anti-Freeze Etc. Preps); SITC 744 (Mechanical Handling Equipment, & Pts Thereof, NES); SITC 247 (Wood In The Rough Or Roughly Squared); SITC 581 (Tubes, Pipes And Hoses Of Plastics); SITC 022 (Milk, Cream, Milk Products Except Butter Or Cheese); SITC 582 (Plates, Sheets, Film, Foil & Strip, Of Plastics); SITC 776 (Thermionic, Cold Cathode, Photo-Cathode Valves Etc.); SITC 656 (Tulles, Lace, Embroidery, Ribbons,

Trimmings, Etc.); SITC 749 (Nonelectric Parts & Accessories Of Machinery NES); SITC 211 (Hides & Skins (Except Furskins), Raw); SITC 892 (Printed Matter); and SITC 893 (Articles, NES Of Plastics).

The export commodities listed in this paragraph represent good long-term potential opportunities for ocean carriers because they are fast-growing on a trade-wide basis and moved south in total 1993 volumes exceeding 20,000 TEUs. The problem with these cargoes is that ocean transportation is losing market share in them, albeit a share that was already small, to other modes in the trade. This indicates low shipper recognition, better marketing by the other modes, uneconomical routing or the possibility that maritime transportation is not meeting shipper needs. Ocean carriers should target the following commodities with well-planned marketing strategies: SITC 554 (Soap, Cleansing And Polishing Preparations); SITC 057 (Fruit, Nuts (Not Including Oil Nuts) Fresh Or Dried); and SITC 784 (Parts And Accessories Of Motor Vehicles, Etc.).

The export commodities listed in this paragraph represent good long-term, but more limited, potential opportunities for ocean carriers. They are fast-growing trade-wide, but moved south in total 1993 export volumes of less than 20,000 TEUs; hence a smaller pool of cargo available for capture. The other problem with these commodities is that ocean transportation is losing market

share in them, which is currently small anyway, to other modes in the trade. This could indicate low shipper recognition, better marketing by other modes or the possibility that ocean transportation is not meeting shipper needs. Moreover, maritime transport cannot effectively compete for portions of these commodities that move in the maquiladora trade. Regardless, cargo capture is an endogenous force that ocean carriers can exert some control over, particularly in longer-distance trades. These commodities include: SITC 679 (Iron & Steel Tubes, Pipes & Hollow Profiles, Fittings); SITC 111 (Non-Alcoholic Beverages, NES); SITC 263 (Cotton Textile Fibers); SITC 713 (Internal Combustion Piston Engs, And Pts, NES); and SITC 821 (Furniture & Pts, Bedding, Mattresses, Etc.).

The export commodities listed in this paragraph are declining or growing more slowly than the trade-wide average. Nevertheless, they represent larger, short-term opportunities to maximize any benefits remaining in a particular commodity. Ocean transportation is capturing significant amounts of these cargoes from other modes in the trade. Long-term marketing strategies, however, should not consider these commodities. Ocean carriers should pursue them, on a short-term basis only, to capture any remaining market share. They moved south in total 1993 volumes exceeding 20,000 TEUs and may be attractive short-term alternatives for filling out loads. Market realities may also demand continued ocean

services in these commodities. They include: SITC 248 (Wood, Simply Worked And Railway Sleepers Of Wood); SITC 081 (Feeding Stuff For Animals Not Incl Unmilled Cereal); SITC 523 (Metallic Salts And Peroxysalts Of Inorganic Acids); and SITC 571 (Polymers Of Ethylene, In Primary Forms).

The export commodities listed in this paragraph are declining or growing more slowly than the trade-wide average. Nevertheless, they represent smaller, short-term opportunities to maximize any benefits remaining in a particular commodity. Ocean transportation is capturing significant amounts of cargo, in the majority of these commodities, from other modes. Long-term marketing strategies, however, should not consider them. Ocean carriers should pursue these cargoes, on a short-term basis only, to capture any remaining market share. These export commodities were moving in total 1993 volumes of less than 20,000 TEUs. They still may be attractive short-term targets for, say, certain southbound backhaul movements. Market realities may also demand continued service in them by ocean transportation. They include: SITC 598 (Miscellaneous Chemical Products, NES); SITC 112 (Alcoholic Beverages); and SITC 741 (Heating & Cooling Equipment And Pts Thereof, NES).

Finally, the export commodity SITC 522 (Inorganic Chemical Elements Oxides, Halogen Salts) is declining on a trade-wide basis and ocean transportation is losing market share in it. This is a worst-case scenario for maritime

transportation. Only about 1,900 TEUs of this commodity moved by water in 1993, out of a total of approximately 64,200 TEUs moving south trade-wide. This commodity should not be pursued further. It should be put on, at the most, a present customer accommodation status. This would release limited marketing resources for more-effective application towards attracting other long-term, higher-growth cargoes.

All commodities analyzed in this chapter should only be included in or excluded from long-term, strategic marketing plans after further assessment at the five-digit level. See United Nations (1986) for a five-digit subdivision of all three-digit SITC commodities listed above. Moreover, the optimal choice may not always be feasible due to trade realities, such as the current location of most maquiladora operations along the US-Mexico border or commodity peculiarities. This study did not address the small lots export market.

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

Summary

The historical analysis revealed that US-Mexico maritime transportation has been hindered by many factors throughout the twentieth century. Mexico's economic, political, and transport development policies are largely responsible for market underutilization of the mode. Some of these impediments are discussed below. First, nationalistic articles in Mexico's Constitution have handicapped the development of a truly efficient transportation system since 1910. They continue to restrict private and foreign investments in key sectors of the economy, although such limits are being modified in many areas. Even though Mexico still limits foreign investors to a 49 percent share in most cases, it is presently opening port and rail operations concessions to 100 percent private and foreign ownership. These investors will bring new management ideas, long-term capital inflows, and cargo-handling technology into Mexico's transport system, which will eventually provide the country with a truly efficient intermodal network.

Mexican import substitution and other protectionist policies have also hurt the development of maritime

transportation in the US-Mexico trade. They precluded the need for a port system, which functioned at international levels of efficiency, for many years. Mexico finally abandoned import substitution in the early 1980s and adopted more liberal trade policies. It was forced to do so when the problems inherent with such policies began to overwhelm the Mexican economy. Its government now recognizes the great importance of an efficient port system to effective competition in global commerce. Massive programs to upgrade Mexico's entire transportation network, including the port system, are currently underway.

Mexico's initial drive to integrate its population after the 1910 revolution resulted in an early governmental subordination of the maritime transport sector relative to the land modes. Mexican highways and railroads were upgraded first, both to integrate the economy and to handle increasing essential capital goods and raw materials imports from the US. Maritime transportation received far less attention until the 1970s, when Mexico's coastal bulk and break-bulk trades, as well as its foreign oil trade, rapidly expanded. The 1995 Mexican government and business community, however, recognize that efficient container port operations are crucial to global commerce, particularly now that Mexico is an export-based economy and world leader in low-cost manufacturing. Mexico is currently taking substantial measures to improve its port system.

The fact that Mexico rejected containerization for so long, as did the rest of Latin America, is largely responsible for ocean transportation's small share of the US-Mexico market. Such technologies are capital intensive and generally unnecessary under a system of import substitution and protectionism. Regardless, most of the developed world had already adopted containerization by 1970. This gave them a distinctive advantage over Latin American countries when import substitution and protectionism ultimately failed in the region during the early-1980s. Regardless, Mexico has since undertaken extensive measures in its drive to bring its container ports and other marine facilities up to international levels of efficiency. While great progress has been made since 1989, much work still needs to be done.

Efficiency in Mexico's transportation system was also lacking, partially because of the typical effects of a petroleum-based economy, during the 1970s. Once oil became the primary source of revenue for Mexico, corruption became widespread throughout the country. This was particularly true along the Mexican waterfront, where crime, corruption, and inefficiency were common. Mexico became overly dependent on oil revenues and the petroleum giant, PEMEX, wielded great control over the development of Mexican ports during the 1970s. This resulted in the relegation of new container-handling facilities to a position of secondary importance in the Mexican economy. After the global oil market crashed in

the early-1980s, however, Mexico aggressively sought to expand its manufacturing sector. This industry is far more stable than the oil trade. Manufactured goods eventually surpassed petroleum in importance to Mexico's economy. Beginning in 1988, President Salinas embarked on converting the country's economy into one based on exports, which required a more-efficient port system to handle increasing general cargo flows.

Inopportune global and domestic financial crises were another major impediment to Mexican port development. The Great Depression of the 1930s compelled Mexico to adopt a policy of import substitution. It did so in an effort to insulate the country from global economic pressures. Import substitution also precluded the need for an efficient port system. During the late-1970s and early-1980s, Mexico began an extensive upgrade of its transportation system under an expansionary fiscal policy. A global recession and the collapse of world oil prices in 1982 forced Mexico to put its transportation upgrade program, which included the port system, on hold. This action was needed for President de la Madrid to turn around the troubled Mexican economy. Thus, port upgrades were largely put on hold until the late-1980s. Major transport system upgrades resumed in 1989 and were making exceptional progress by the time NAFTA was implemented in 1994. At the end of that year, however, the Mexican Peso crisis set in. It severely disrupted cargo flows in the US-

Mexico trade. Nevertheless, the devaluation forced Mexico to make fundamental changes in its transportation system, such as privatizing the state-owned railroad, FNM, and accelerating the release of container port concessions to private bidders. Both of these developments will provide Mexico with a more efficient transportation system in the long-run. Moreover, most ocean carriers serving the US-Mexico trade view the crisis as being temporary in nature and plan to continue service in the market.

The fact that Mexico has had relatively good access to world-class US container ports is another reason for excessive delays in Mexican container port development. Container-handling facilities are very capital-intensive and Mexico was struggling to turn its economy around during the 1980s. Thus, Mexican traders were able to route most of the country's foreign container traffic through more-efficient US ports and expanding intermodal connections. As of 1989, however, Mexico has sought to re-capture Mexican foreign trade containers being routed through US ports by aggressively upgrading its own container port system. Throughput at Mexican ports has expanded rapidly since 1989.

Maritime transportation has also been hindered by a low level of shipper recognition, particularly with general cargo shipments, throughout most of the century. This was due to the early development of highway and rail systems, which were later expanded north to handle increasing imports of

essential capital goods and raw materials from the US. During the 1960s, the introduction of the maquiladora industry along the US-Mexico border led to new relationships between shippers, consignees, trucking firms, and railroads. These relationships were further enhanced as trade between the two countries continued to increase prior to NAFTA. Carriers (in all modes), shippers, and consignees actively sought alternative routes to avoid the corrupt and inefficient Mexican waterfront. Land-based intermodal connections out of US ports also expanded as a result. This scenario predominated the trade until major changes began to occur in Mexico's port system under President Salinas. In 1995, however, many shippers are simply either unaware of the benefits of waterborne transportation or are unwilling to change modes even when the economics justify a switch. The latter most-likely occurs because of shipper reluctance to terminate relationships with land-based carriers that have been established over many years. Improving shipper recognition is the biggest challenge facing ocean carriers in the 1995 US-Mexico trade.

Mexico has tried to upgrade its port system on several occasions since 1910. These improvements, however, were carried out by a highly-centralized and bureaucratic government that did not adequately comprehend the importance of an efficient port system. Decisions were made in Mexico City instead of at a local level. Although Mexico has taken

extensive measures to decentralize its port system since 1989, personnel from the old centralized port authority, Puertos Mexicanos, are involved in operating the new semi-autonomous port administrations. Many of them do not fully understand free market concepts and continue to hinder progress with outdated, centralist port administration practices. The peso crisis, however, is forcing Mexico to adopt international business standards, which will make the country much stronger in the long-run. Regardless, it will take time for these administrators to change their old habits. Carriers interested in the trade will have to approach it with a high level of patience, understanding, and flexibility. Aside from these problems, major changes continue to take place in the Mexican port system, which will greatly enhance the role of maritime transportation in the US-Mexico trade.

Finally, maritime transport services have been limited in the US-Mexico trade partially because of a geographical exclusion from major industrial regions in the north. Much of Mexico's manufacturing industry lies along the US-Mexico border, where ocean transportation cannot effectively compete. Moreover, major northern industrial regions, such as Monterrey, are better served by land modes because of their close proximity to the US. Regardless, ocean transportation will eventually be able to compete for maquiladora commerce once the Mexico disperses new in-bond

plants farther south. The government gradually wants to spread the benefits of its maquiladora industry throughout Mexico.

Despite the wide variety of impediments to US-Mexico maritime transportation over the years, container throughput has been steadily increasing at Mexican ports since the mid- to late-1980s. A growing number of ocean carriers are now serving the US-Mexico trade as Mexican ports become more efficient. Long-term, trade-wide growth is already occurring — and is expected to continue — under the North American Free Trade Agreement. Thus, ocean carriers will have increasingly greater amounts of cargo to pursue over the long-term. The Mexican Peso crisis, however, is having a negative, short-term impact on all sectors of the Mexican economy, including waterborne transportation. The crisis is nevertheless considered to be a temporary setback by most ocean carriers in the trade. Meanwhile, Mexico is carrying out extensive austerity measures to regain control of its economy (Providence Sunday Journal, 1995, p. A4). Long-term opportunities still exist in this trade for ocean-liners willing to ride out the current economic turmoil. Carriers in all modes are positioning themselves to take advantage of anticipated future growth, which should occur once Mexico becomes stabilized and the incremental benefits of NAFTA take effect. The future looks promising for ocean-liner operators in the US-Mexico trade because of substantial improvements at

Mexican container ports, new potential for east-west intermodal connections, expanding investment opportunities, and historically strong cargo flows that are expected to increase even further under NAFTA.

> Shipping by sea to Mexico is an established, efficient trade with prospects for expansion (Traffic World, 1993, p. 20).

The ex post facto study revealed several long-term, high-growth commodities, which are classified as suitable or excellent for containerized transport, that have good cargo capture potential for steamship companies operating in the US-Mexico trade. They are listed in the final conclusions section. This study also revealed certain commodities that have more limited potential for capture. Ocean transport decision-makers can utilize the results of this study in their efforts to rationalize limited marketing and capital resources. Nevertheless, carriers should review all three-digit SITC shift-share results only in conjunction with five-digit SITC information when selecting target commodities. SITC 633 (Cork Manufactures), for example, can be partitioned into the following five-digit codes: SITCs 633.10 - articles of natural cork, 633.11 - corks and stoppers, 633.19 - other, 633.20 - agglomerated cork (with or without a binding substance) and articles of agglomerated cork, 633.21 - blocks, plates, sheets, strip, tiles and solid cylinders, and 633.29 other (United Nations, 1986, p. 42). Also, see National Trade Data Bank (1994) for five and seven-digit SIC

domestic commodity classifications, modes of transport, weights, and values of US exports.

Decision-makers should never rely on only one source of information, particularly in a market as dynamic and volatile as the 1995 US-Mexico trade. A manager must also be cognizant of the physical characteristics inherent in a particular commodity. He should investigate any economic, geographical, and/or political factors that may be affecting trade in a particular commodity, as well.

Ocean carriers need to take extensive measures to improve US and Mexican shipper recognition, as well as customer satisfaction. These are the biggest problems facing maritime transportation in the 1995 US-Mexico trade. There are many ways to enhance the industry's reputation and visibility, such as providing shippers with more competitive rates and higher-quality services (Distribution, 1991, p. 66). Within Mexico, the service sector is the country's greatest area of weakness. "Whether waiting for photocopies or shipping produce, everything is slow. The inefficiency of the service sector ripples throughout the economy, resulting in lost time and productivity. The service sector was a major contributor to the inflation of the 1970s and 1980s" (Fraser, 1992, p. 88). This indicates that tremendous gains can be made in the US-Mexico market by paying greater attention to customer needs and more-effectively marketing ocean transport services on a trade-wide basis. Trade

organizations, in particular, should be the targets of aggressive ocean transport marketing campaigns.

The study's overall shift-share results can actually be used in several different ways. Carriers could utilize them to assess the performance of other commodities they regularly handle in the US-Mexico trade. Smaller carriers could identify potential cargoes in the small lots trade, as well. They could also analyze commodities that have relatively strong trade share, proportionality shift, and differential shift factors, which are not on the top-twenty import and export lists. Carriers could target these commodities for less-than-container-load (LCL) shipments or to generate backhaul revenue.

Conclusions

The hypothesis, that the underutilized ocean transport sector has captured — from the air and land sectors of the US-Mexico trade — significant quantities (at least 100 twenty-foot equivalent units or TEUs) of high-growth, general cargoes between 1989 and 1993, was accepted. These commodities are classified as being excellent or suitable for containerized transport. Maritime transportation could gain an even greater share of the market, however, by implementing aggressive marketing strategies. Various other import and export commodities, with long-term (and even short-term) potential for capture by ocean carriers, were also revealed.

Maritime transportation captured significant amounts of import cargo (quantities exceeding 100 TEUs) in each of the following fast-growth commodities between 1989 and 1993: SITC 057 (Fruit, Nuts (Not Including Oil Nuts) Fresh Or Dried); SITC 112 (Alcoholic Beverages); SITC 523 (Metallic Salts And Peroxysalts Of Inorganic Acids); and SITC 664 (Glass). Another import commodity, SITC 054 (Vegs Frsh, Chld, Froz, Roots, Tubers Etc. Fresh, Dried), is also fast-growing. It has tremendous potential for ocean transportation, even though the mode gained only 35 TEUs of it from the land transport sector between 1989 and 1993. All of these commodities moved north in total trade-wide amounts exceeding 20,000 TEUs during 1993.

Maritime transport captured significant amounts of export cargo (quantities exceeding 100 TEUs) in each of the following fast-growth commodities between 1989 and 1993: SITC 516 (Organic Chemicals, NES); SITC 634 (Veneers, Plywood, Particle Brd, Other Worked Wood NES); SITC 642 (Paper & Paperboard, Cut To Size Or Shape, Articles); SITC 597 (Additives For Mineral Oils Etc., Anti-Freeze Etc. Preps); SITC 744 (Mechanical Handling Equipment, & Pts Thereof, NES); SITC 641 (Paper And Paperboard); SITC 247 (Wood In The Rough Or Roughly Squared); SITC 574 (Polyacetals Etc., Epoxide Resins Etc., Primary Forms); SITC 012 (Meat NES & Edible Offal, Frsh, Chld, Froz); SITC 581 (Tubes, Pipes And Hoses Of Plastics); and SITC 893 (Articles, NES Of Plastics). Many of

these commodities moved south in total trade-wide amounts exceeding 20,000 TEUs during 1993.

In conclusion, major economic developments in Mexico over recent years are providing ocean carriers with additional opportunities to gain market share in a trade historically dominated by trucking. US-Mexico maritime transportation has been hindered for many years, by both exogenous and endogenous forces, from realizing its true potential. This has occurred despite the fact that ocean transport is the most economical way to move cargo over longer distances. Regardless, major progress is being made to improve the mode's role in the market. Waterborne commerce is far more prevalent in the 1995 US-Mexico trade than it was just ten years ago, particularly in regard to general cargo. Mexico's extensive port upgrade and privatization program, which was initiated in 1989, has facilitated a dramatic increase in vessel traffic. Many carriers now view Mexico as a 'stepping off point' for future expansion into the rest of Latin America (Thuermer, 1994b, p. 26). This region is the United States' fastest growing export market. It is comprised of 444 million consumers, who purchased over $75 billion of US exports in 1992 (Manzella, 1994, p. 2).

It is recommended that ocean-liner operators serving the US-Mexico market adopt aggressive, multifaceted marketing strategies to capture additional market share. They should

specifically target the high-growth import and export commodities revealed by this study. The US-Mexico trade will most-likely continue to have strong, long-term growth potential for all modes of transport in the years to come. Most of NAFTA's incremental benefits, regardless of the recent fiscal setbacks, have yet to be realized.

APPENDIX A

DEFINITIONS OF TERMS

AutoStack: A patented rack for shipping autos in marine containers. Two racks are loaded with cars (two or three cars per rack), stacked on top of each other, and stuffed into a container. Once unloaded, these racks can be collapsed and stowed six high in a single container for the return trip. This avoids an empty backhaul (Kaufman, 1994b, p. 5C).

Backhaul: "A carrier's return movement, opposite from the direction in which it earns higher revenue" (US Department Of Transportation, 1993a, p. 191).

Break-Bulk: A break-bulk vessel hauls and handles break-bulk cargo, i.e. non-uniform, miscellaneous general cargo, with its own equipment thus precluding the need for shore-side cargo handling superstructure.

BulkTainer: The trade name for an intermodal tank container developed by Union Pacific Railroad in 1987. It was designed to transport minor bulk cargoes, such as liquor, chemicals or other bulk cargoes, in less than full tank truck or rail car lots (Johnson, 1994, p. 3B).

Cabotage: Laws reserving a nation's coastal or domestic trade for carriers of its own flag of registry.

COFC: Container-on-flat-car or COFC refers to the shipment of a container, without the chassis, aboard a railroad flat car.

Container: A standardized cargo box that has a permanently hinged door or closure permitting easy access to cargo. It can be sealed as a single unit of transport and moved by truck, rail or ship.

Deadhaul: A term used in the transportation industry that refers to the movement of a freight container, trailer or rail car without cargo inside. It is merely being re-positioned and generates no revenue.

Double-Stack: Double-stack rail service is the movement of two intermodal containers, stacked one on top of the other, aboard special-built rail cars. These cars move individually as part of a larger train or in unit-trains that move only containers.

DWT: Deadweight tonnage refers to the total lift capacity of a ship. It is expressed in long tons of 2,240 pounds.

General Cargo: Any manufactured goods or raw materials shipped in non-uniform packages.

In-Bond: Goods that have not yet been assessed duties. This cargo is either stored in a bonded or secure warehouse awaiting payment or is in-transit to another point where the duty will be assessed.

Hinterland: A market area landward of a port.

Intermodal: The combined movement of cargo containers by ship, rail, and truck, without having to strip and re-stuff the cargo when transferring between modes. The container remains a self-contained unit from point-of-origin to point-of-destination. Air freight containers are generally incompatible with the other three modes. Thus, air cargo must be re-packed at the point of transshipment. An intermodal shipment involves more than one mode of transport.

Land-Bridge: "The provision of a cargo movement overland between two separate voyages by sea (a sea-land-sea movement). [It may] ...also refer to a land-sea-land movement" (US Department Of Transportation, 1993a, p. 192).

LCL: Less-than-container load services are consolidated, small-lot cargoes from several shippers that are unable to individually fill a container.

Maquiladora: "...[P]lants in Mexico which further process or manufacture US components for reshipment back to the United States, at which point the US tariff is levied only on the value added in Mexico..." (Weintraub, 1992, pp. 50-51). They are also called in-bond factories and are not allowed to compete domestically.

NAFTA: The North American Free Trade Agreement was designed to reduce trade barriers between the United States, Mexico, and Canada in order to stimulate international commerce and economic growth. This agreement, which *is not* a treaty, is known as NAFTA in the United States and English-speaking Canada, Tratado de Libre Comercio or TLC (Free Commerce Treaty) in Mexico, and Accord de Libre-Échange Norde-Americain or ALENA (North American Free Trade Accord) in French-speaking Canada (Traffic Management, 1994, pp. 85A-86A).

Neo-Bulk: Neo-bulk vessels transport homogeneous goods in shipload lots, such as autos or lumber, which were formerly break-bulk cargoes.

Ocean-Liner: "...[S]ervice offered by regular line operators of vessels. The itineraries and sailing schedules are predetermined and fixed, and most of the cargo is containerized general cargo" (US Department Of Transportation, 1993a, p. 192).

Ro/Ro: A roll-on/roll-off or ro/ro vessel is a type of general cargo ship that permits vehicles to drive on and off, either carrying cargo or as cargo themselves, utilizing a ramp system.

SITC: Standard International Trade Classification refers to a form of "...statistical classification of the commodities entering external trade designed to provide the commodity aggregates needed for purposes of economic analysis and to facilitate the international comparison of trade-by-commodity data" (US Department of Commerce, 1993a, p. 5).

TEU: A twenty-foot equivalent unit or TEU is a cargo box with dimensions of approximately 8 feet x 8 feet x 20 feet. It is also an internationally accepted standard used for statistical comparisons within the transportation industry.

TOFC: Trailer-on-flat-car or TOFC refers to the shipment of a truck trailer or container with attached chassis aboard a railroad flat car. It is a form of intermodal transport also called *piggyback service*.

Tramp: "Irregular service afforded by vessels, other than tankers, that are chartered or otherwise hired for the carriage of goods on special voyages. Service is not predetermined or fixed. Most of the cargo is dry bulk, but it also includes general cargo moved in ship-load lots" (US Department Of Transportation, 1993a, p. 192).

Unitization: Refers to the physical use of containers, barges, pallets, rail cars or truck trailers to group "...a number of small or medium-sized packages into homogeneous units to facilitate their handling by mechanical means" (United Nations, 1987, p. 68).

APPENDIX B

GENERAL RESOURCES REVIEWED

Books, Atlases, and Directories

Several ocean transportation and Latin American commerce-related books, *AAPA Seaports of the Western Hemisphere*, *Atlas of Mexico*, *Fairplay World Ports Directory*, *Journal of Commerce* special publications, *Random House Compact World Atlas*, *World Port Index*, and *U.S.- Mexico Trade Pages*.

Academic Journals

Business Quarterly, *Journal of Business Logistics*, *Journal of Economic Issues*, *Journal of Economic Perspectives*, *Journal of Interamerican Studies and World Affairs*, *Journal of World Trade*, *Latin American Research Review*, *Marine Policy*, *Maritime Policy and Management*, *Monthly Review*, *Transportation Journal*, *Washington Quarterly*, and *World Development*.

Trade Literature

American Shipper, *Business America*, *Business Mexico*, *Cargo Systems International*, *Containerisation International*, *Intermodal Shipping* (formerly called *Intermodal Container News*), *Distribution*, *Dock and Harbor Authority*, *Fairplay*, *Global Trade & Transportation*, *International Trade Forum*, *Marine Digest and Transportation News*, *Offshore/Oilman*, *Railway Age*, *Seatrade Review*, *Seaway Review*, *Traffic Management*, *Traffic World*, *Transportation and Distribution*, *World Wide Shipping*, *Journal of Commerce and Commercial*, and several daily newspapers.

Government Publications and Computer Products

United Nations reports, US Army Foreign Area Studies, US Department of Commerce (Bureau of the Census) statistics, US International Trade Commission publications, US Department of Transportation (Maritime Administration) publications, and *National Trade Data Bank* compact disks.

APPENDIX C

PRIMARY MEXICAN CONTAINER PORTS: BASIC INFRASTRUCTURE

Altamira: Three container cranes, four rubber-tire gantry cranes, three container berths (250 meters each, 12 meter depth), rail connections, and warehouse facilities.

Lázaro Cárdenas: Three container cranes, four rubber-tire gantry cranes, one container berth (286 meters, 12 meter depth), ship repair available, and rail connections.

Manzanillo: Two container cranes, four rubber-tire gantry cranes, one container berth (250 meters, 12 meter depth), ship repair available, rail connections, and refrigerated facilities.

Veracruz: Four container cranes, four rubber-tire gantry cranes, one container berth (330 meters, 11 meter depth), ship repair available, rail connections, and warehouse facilities.

Sources: Fairplay (1993, pp. 473-479), Intermodal Shipping (1994, pp. 38-55), and Munford (1993, p. 29)

APPENDIX D

MEXICAN DEEPWATER GENERAL CARGO PORTS
(1989 & 1992 CONTAINER FLOWS)

Mexican Ports	1989 Cargo Flows *(in TEUs)*	1992 Cargo Flows *(in TEUs)*
ACAPULCO	4,553	4,259
ALTAMIRA	34,257	52,978
COATZACOALCOS	3,470	N/A
ENSENADA	N/A	19,296
GUAYMAS	7,918	N/A
LAZARO CARDENAS	26,858	45,409
MANZANILLO	25,847	50,419
MAZATLAN	3,650	7,779
MORELOS	1,592	3,960
PICHILINGUE	N/A	6,192
PROGRESSO	1,099	6,033
SALINA CRUZ	14,768	12,405
TAMPICO	23,412	42,597
TOPOLOBAMPO	N/A	125
TUXPAN	35,145	16,460
VERACRUZ	86,441	178,181
TOTAL	269,010	446,093

Sources: Fossey (November 1991b, p. 75), Fossey (March 1994a, p. 33), and Munford (March 1993, p. 28)

APPENDIX E

OCEAN-LINER AND BARGE COMPANIES PROVIDING WATERBORNE CONTAINER TRANSPORT SERVICES IN THE US-MEXICO TRADE *(WITH MEXICAN PORT CALLS)*

Americas Marine Express *(Progreso)*
American President Lines - APL *(Manzanillo, Lázaro Cárdenas)*
Atlantic Container Line - ACL *(Veracruz)*
Australia-New Zealand Direct Line *(Manzanillo)*
Canal Barge Co., Inc. *(Mexico)*
Cargo Transport Lines *(Veracruz, Progreso)*
Caribbean Ocean Shipping *(Progreso, Tuxpan)*
Compañía Chilena de Navegación Interoceánica - CCNI *(Altamira, Manzanillo)*
Compagnie General Maritime - CGM *(Veracruz, Altamira, Tuxpan)*
F.X. Coughlin Co. *(Mexico)*
Crowley American Transport *(Progreso, Veracruz, Tampico/Altamira)*
Empresa Lineas Marítimas Argentinas *(Mexican wayport calls - on inducement)*
Frota Amazonica S.A. *(Tampico)*
Hapag-Lloyd *(Veracruz, Altamira, Tuxpan)*
Hybur *(Puerto Morelos/Cancun)*
Hoegh Lines *(Tampico, Altamira)*
Ivaran Lines *(Altamira, Veracruz, Tuxpan)*
Lauritzen Reefers *(Manzanillo)*
Línea Peninsular *(Progreso)*
Lykes Bros. Steamship Co., Inc. *(Veracruz, Altamira, Tuxpan)*
Maersk Line *(Manzanillo, Veracruz)*
Marmex Line *(Topolobampo)*
Maruba *(Mexican wayport calls - on inducement)*
Meridian Line *(Puerto Morelos)*
Mitsui O.S.K. Lines, Inc. - MOL *(Manzanillo)*
Nacional Line *(Veracruz, Altamira)*

Nedlloyd Lines *(Lázaro Cárdenas, Manzanillo on a wayport call basis)*

Nippon Yusen Kaisha - K Line *(Manzanillo, Acapulco, Salina Cruz on a wayport call basis)*

Norsul *(Mexican wayport calls - on inducement)*

Seaboard Marine *(Manzanillo)*

Sea-Land Service Inc. *(Manzanillo, Lázaro Cárdenas, Altamira, Veracruz)*

Shipping Corp. Of India - SCI *(Mexico)*

Tecomar, S.A.- Naviera Mexicana *(Veracruz, Altamira, Tuxpan)*

Thompson Shipping Co. Ltd. *(Progresso)*

Transportación Marítima Mexicana S.A. - TMM *(Veracruz, Altamira, Ensenada, Manzanillo, Lázaro Cárdenas, Salina Cruz, Tuxpan)*

Transportes Navieros Ecuatorianos - Transnave *(Tampico)*

Tropical Shipping *(Puerto Morelos/Cancun)*

Venezuelan Line *(Tuxpan)*

Zim Container Service *(Veracruz, Tuxpan)*

Note: "Tampico and Altamira are adjacent ports that are often referred to as one port" (Hall, 1995h, p. 8A).

Sources: Fossey (1994c, p. 52), Global Trade & Transportation (April 1993b, p. 28), Intermodal Shipping (September 1994, pp. 35 and 55), Journal Of Commerce (17 October 1994b, pp. 1-40), Traffic Management (March 1993b, pp. 141-152), Hall (1995g, p. 8B), and DiBenedetto (1995, p. 2C)

APPENDIX F

PRIMARY CHRONOLOGICAL LISTING (1870-2008)
(BY DATE, EVENT CODE, AND EVENT)

DATE	CODE	EVENT
1870-1910	E	Mexico is open to foreign investors.
1882	T	Union Pacific begins serving Mexico.
1910	E	The Mexican Revolution begins.
1910	T	Most rail lines in Mexico are completed with interconnecting lines subsequently completed in 1980. Most Mexican rail lines follow the topography in a north-south direction.
1910	T	The Mexican Federal District is established as the focal point for many railroads.
1910-1920	E	Mexico is engulfed in a revolution. The lower class is uprising against the upper class.
1910-1940	E	Mexico experiences a decrease in foreign investment and control.
1910-1990	E	Mexico remains relatively closed to foreign investors.
1912	T	Mexican Constitution Article 28 prohibits foreign operation of its railroads, electricity, satellite, and petroleum sectors because it considers them to be of national strategic importance. They are to be operated by the government only.
1912	W	Under Article 27 of Mexico's constitution, land adjacent to the waterfront and the waterfront itself cannot be sold to private interests. It must remain public.
1917	E	Mexican presidents are limited to one term by the constitution. This gives the population a profound sense of new hope with each election.
1917	E	Mexico has a centralized, authoritarian government following the Mexican Revolution.
1917	T	Mexico drafts its post-revolution constitution which prohibits foreign ownership of the state railroad, Ferrocarriles Nacionales de Mexico or FNM.
1917	T	Mexico begins to construct a national highway system.
1917	T	Mexico's domestic aviation begins to develop as topographic barriers hinder road construction. Topography is the most important factor in the growth of Mexican aviation.
1920	E	This year marks the end of Mexico's revolutionary period.
1929	E	The Mexican political party, Partido Revolucionario Institucional or PRI, is formed and dominates Mexican politics (under various names) ever since.
1929	E	The world economy collapses into the Great Depression.
1930s	E	Mexico follows a course of protectionism as do many other developing countries.
1930-1980	E	Compared to the rest of Latin America, Mexico is relatively stable both politically and economically. It has an average 5 percent annual growth in gross domestic product throughout the period.
1930-1995	E	Mexico requires at least 51 percent domestic ownership of all corporations based in the country.
1934-1940	E	Mexican President Lazaro Cardenas sets up a corporatist social and political structure by incorporating all sectors of society into the PRI.
1938	E	Mexico nationalizes foreign oil interests.
1940	E	Mexico's foreign trade expands steadily.
1940-1958	T	Public sector telecommunications and transportation investments help integrate the Mexican economy.
1940s-1980s	E	More than 30 percent of Mexico's total public funds are invested in PEMEX, the state-run oil company, to provide for continued hydrocarbon exploration, oil port development, and refinery construction.
1940-1994	E	The Mexican economy becomes more and more influenced by the US economy.
1942-1951	E	Mexico and the US share unprecedented technical and military cooperation.
1945	E	Mexico adopts policies that limit foreign investment.
1945-1982	E	Mexico has a progressive set of quota restrictions.

1947	E	General Agreement on Tariffs and Trade (GATT) is established to liberalize world trade.
Post-1940s	W	Rapid technological change, intense competition, and intermodalism leave Latin American countries with inferior maritime systems.
1950s-1960s	E	Mexican federal economic policies more or less coincide with those of the private business community. GDP grows at an annual rate of 6.5 percent.
1952	E	Mexico steers clear of entering into a mutual defense pact with the US at the outset of the Cold War.
1956	W	Sea-Land introduces containerized transport to facilitate growing trade volumes and overcome inefficient, labor-intensive, and damage-prone port operations.
1960	E	Mexico's foreign trade expands more rapidly.
1960	W	Transportacion Maritima Mexicana (TMM) purchases Mexican Line from US and Norwegian owners and enters into regular liner service between the US and Mexico.
1960s	E	Around 85 percent of Mexico's savings go to supporting productive enterprises.
1960s	T	United Airlines pioneers the 'just-in-time' delivery system.
1960-1974	E	Mexico's growth in exports has mostly consisted of manufactured goods, much of which is from maquiladora plants.
1960-1980	W	Liner shipping policies in Latin America are fragmented and activities supporting regional trade develop in isolation.
1960-1980	W	Latin American liner policies reflect centralized national authorities, independently functioning transport modes and support activities, an inherent resistance to new technology (i.e. containerization) and a belief in continued demand for its exports.
1960-1987	E	Trade in Latin American exports during this period is sluggish.
1960-1995	E	The ongoing process of social and economic integration between the US and Mexico continues.
1961	E	Mexico joins the Latin American Free Trade Association (LAFTA) to reduce trade barriers. It diversifies some of its trade away from the US to Latin America. Mexico is also wants to expand trade with Japan and Europe.
1965	E	Mexico promotes in-bond plants (maquiladoras) under the Border Industrialization Program (BIP) to encourage direct investment in the border region. Twelve plants are in operation.
1968	T	United Airlines establishes the first sea-truck-air intermodal route to bypass congested and restricted airports.
1969-1987	E	Mexico's foreign debt rises from $4.5 billion in 1969 to $104 billion in 1987. Its internal debt increases from $4.8 billion to $50 billion over the same period.
1970	E	Mexico is now, for the most part, self-sufficient in food crops, steel, and most consumer products.
1970	E	Mexico's national economic plan begins to break down.
1970	E	Mexican President Echeverria has to contend with growing strain in Mexico's import substitution model and greatly expands government control over the economy.
1970	E	Public spending accounts for 20 Percent of Mexico's GNP.
1970	T	Mexico begins taking measures to upgrade its transportation sector.
1970	W	The marine container is now the accepted unit of ocean-liner transportation.
1970-1976	E	Mexican President Echeverria is in office.
1970-1976	E	The Echeverria Administration's statist economic policies lead to inflation, deficit financing, public debt, and monetary expansion.
1970s	E	Mexico's growth is primarily based on crude oil exports.
1970s	E	Mexico is producing most of the consumer goods needed by its population under import substitution, a policy followed since the 1930s.
1970s	E	Mexico discovers large oil deposits. The huge inflow of foreign exchange fosters widespread corruption.
1970s	W	Mexico places more of an emphasis on marine transportation by planning major upgrades in the industry.
1970-1979	E	The economic environment in Latin America is positive and regional countries have the opportunity to undertake national projects.
1970-1979	T	Mexico develops its energy, transportation, and domestic industry sectors with an expansionary fiscal policy, increasing petroleum revenues, and foreign borrowing.
1970-1982	E	Mexico is plagued by widespread corruption and waste.

1970-1985	E	Global trade in manufactured goods (excluding steel and iron) had a 13.2 percent annual growth rate, which was higher than the 12.9 percent growth rate for all goods over the same period.
1970-1986	E	The number of Mexico's state-run enterprises grows from 180 at the beginning of the period to 1,155 at the end of the period.
1970-1988	T	Mexico's rail lines only grow by 2,624 kilometers to 26,010 total Km in 1988.
1970s-1980s	E	The negative effect of Mexico's import substitution policy becomes apparent.
1971	W	Coastal shipping in Mexico gains importance. It carries almost as much cargo as ocean carriers by hauling over 10.6 million tons of domestic freight and 13 million tons of international cargo.
1971-1974	E	Mexico's private sector increasingly opposes Echeverria's populist policies.
Early 1970s	E	Around 75 percent of foreign investment in Mexico is from US sources.
1972	W	The Mexican government completes a study to determine the dredging requirements of the country's twelve largest seaports over the next twenty years.
1972	W	To improve sub-standard port administration, Mexico places the General Directorate of Port Operations, which falls under the Ministry of the Navy, in control of most ports. Five of these are free ports, however, and stay under the Ministry of Finance.
1972	W	Mexican ports are considered to be generally satisfactory although some are not properly dredged, some have under-equipped cargo handling facilities, and financial and administrative management is not coordinated.
1972-1995	E	Foreign investment in Mexico in the area of export production is almost uninterrupted.
1973 October	E	First Middle East oil crisis begins and, along with the foreign debt crisis of 1982, exposes the region to the harsh realities of the world economy.
1973	E	Mexico passes a law that defines areas open to 49 percent foreign investment.
1973	E	Mexico becomes an official observer to GATT.
1973	E	Mexico has export licensing to ensure that domestic needs are covered first in commodities such as oilseeds.
1973	E	Mexico wants to improve its commercial ties with Japan and other Latin American countries to reduce its dependence on the US.
1973	T	Mexico has about 14,700 miles of rail lines.
1973	W	Mexico's merchant marine consists of 650,000 gross registered tons. Of this, 350,000 tons are PEMEX tankers.
1973	W	Transportacion Maritima Mexicana (TMM) operates 33 ocean-going vessels.
1974	E	Mexico is party to relatively few trade agreements.
1974	E	Mexico is a leading exporter of shrimp, meat, machinery, fresh fruit, and vegetables.
1974	E	Mexico is highly dependent on imported raw materials and capital goods to sustain its industrial development.
1974	E	Mexico imports industrial and electrical machinery, chemicals, motor vehicles, and cereals from the US.
1974	T	Mexican Association of Transport Users (AMUTMAC) is founded.
1974	T	Aviation is developed in Mexico but little air freight is carried.
1974	T	Trucking dominates freight shipments up to a distance of around 160 miles. Beyond that, rail and air transportation begin predominating shipments.
1974	T	Mexico's state-owned railways have continual deficits because losses from subsidized passenger service overrides freight profits.
1974	T	Mexican railroads haul mostly minerals, non-perishable products, forest products, and heavy industrial materials. Perishable goods and higher-value cargo move by other modes of transport.
1974	T	Mexico investigates the idea of constructing a trans-isthmus rail line between the ports of Salina Cruz and Coatzacoalcos to compete for Panama Canal cargo. Both ports would also have to be upgraded to accommodate container shipments.
1974	T	Mexico has 1,200 airports and airstrips. About 200 of these are state-owned.
1974	T	Mexico announces higher rail rates for both passengers and freight in an effort to make its state-owned railroads self-supporting. It also begins an equipment upgrade program to improve efficiency.
1974	W	Marine transportation is currently the weak link in Mexico's transportation system. Nevertheless, it is still functional.

1974	W	Mexico has over 50 seaports. Of these, 36 are deep water ports. None of them have good natural harbors.
1974	W	Five Mexican ports handle 80 percent of the country's total tonnage by water. They are Veracruz, Tampico, Guaymas, Mazatlan, and Manzanillo.
1974	W	The Port of Veracruz is a major gateway for imports heading to Mexico City.
1974	W	The Port of Guaymas has large capacity but is underutilized due to longer transits needed to get around the Baja Peninsula.
1974	W	The Port of Tampico is primarily a petroleum port that has a large refinery nearby.
1974	W	Mexico signs the LAFTA Water Transportation Agreement which reserves all cargo moving between party states for party-state carriers. Mexico hopes this will stimulate growth in its merchant marine.
1974	W	The Mexican ports of Tampico, Salina Cruz, Coatzacoalcos, and Tuxpan are the country's major coastal shipping ports.
1974	W	Mexico has paid less attention to maritime transportation because so much cargo moves by truck and rail between the US and Mexico.
1974	W	Mexico only has around 2,000 miles of navigable inland waterways, most of which are shallow.
Mid-1970s	E	The Mexican peso is overvalued, the balance of payments worsens, Mexican tariffs are raised, and Mexican manufacturers are adversely affected.
Mid-1970s-1980s	E	Double-digit inflation discourages investment in Mexico.
1975	T	Latin American countries begin to significantly invest in containerized transport.
1975	W	Liner companies extensively utilize land-bridge systems and limit the number of ports called.
1975-1976	E	Mexican businessmen openly oppose the Mexican government.
1976	E	Mexico announces the discovery of huge oil deposits.
1976-1982	E	Mexican President Portillo is in office.
1976-1982	E	President Portillo triples oil production and doubles the petrochemical industry capacity driving Mexico further into debt.
1976-1988	E	The Echeverria policies create a momentum that Mexican Presidents Portillo and de la Madrid do not stop.
1977	T	The International Organization for Standardization (ISO) publishes its recommended freight container dimensions.
1977-1979	E	The discovery of huge Mexican oil deposits leads to a period of import liberalization.
1977-1982	E	Mexican businessmen support the Portillo Administration due to the prevailing prosperity in the oil industry.
1977-1984	E	International banks loaned billions of dollars to Latin American governments only to be forced to write these loans off later.
1978-1980	E	Mexico experiences an average growth rate of almost 13 percent.
1978-1981	E	The oil boom masks the damage from Mexico's debt and inflationary policies.
1979-1985	T	Mexico builds six new international airports for a total of 35 overall. Most of these are tourist oriented.
1979	W	The tanker market collapses and Mexico begins nationalizing tonnage.
1980 March	E	Mexico decides against joining the GATT negotiations.
1980	E	The price of oil begins to decline.
1980-1982	E	The oil market weakens and foreign interest rates rise dramatically.
1980	T	US deregulates inland transportation with the Staggers Rail Act and the Motor Carrier Act.
1980	T	Mexico has some 50 airports capable of handling medium or large-sized aircraft.
1980	W	Of Mexico's approximately 30 ocean ports, 13 are served by international traffic.
1980s	E	Auto and electronics maquiladoras have the highest growth rates.
1980s	E	PEMEX makes few investments in new technology or exploration as the Mexican government skims its profits to finance foreign debt.
1980s	E	Mexico's excellent export performance is a legacy of the old import-substitution policy that changed forever Mexico's economic structure of comparative advantage.
1980s	T	US-Mexico cross border commerce increases 106 percent but US Customs staffing does not.

1980-1990	E	Anti-dumping duties are the world's most commonly used form of trade protection with the US and Canada initiating almost half of the actions.
1981	T	Sea-Land and Southern Pacific introduce double-stack train service between Los Angeles and the US Gulf Coast.
Early 1980s	E	US companies begin operating maquiladoras in earnest after Mexico devalues its peso.
Early 1980s	E	To attract foreign investment, Mexico begins divesting large publicly held assets like banks, the telephone system, mines, and media enterprises.
1982 August	E	Mexico declares that it is unable to pay the interest on its $100 billion foreign debt due to a crash in crude oil prices and high interest rates.
1982	E	The Latin American debt crisis sets in. New investments needed to generate additional revenue for servicing national debts are postponed. Capital flight ensues.
1982	E	Mexico nationalizes the banking industry.
1982	E	The Mexican peso is devalued to restore the competitiveness of Mexican products in the world market.
1982	E	The Mexican economy collapses and severe import restrictions are initiated thus nullifying the modest trade reforms of the late 1970s.
1982	E	Mexico experiences its first foreign exchange crisis when the price of oil collapses.
1982	E	Mexico begins backing off from import licensing of goods not produced domestically.
1982	E	The international financial system is in crisis.
1982	E	Mexico faces the worst recession since 1929.
1982	E	The Mexican peso is devalued three times and drastic austerity measures are undertaken.
1982	E	Mexican quota restrictions peak when all imports require licenses.
1982-1984	E	The nationalization of Mexico's banking system by the government triggers new opposition from the Mexico's business sector.
1982-1988	E	Mexico's living standard falls as deficit reduction and privatization policies take effect.
1982-1988	E	Investment in Mexico's infrastructure is more or less suspended as the country tries to cope with high inflation and a huge foreign debt.
1982-1988	E	Mexican President de la Madrid is in office. He initiates economic reform because the old system has failed.
1982-1988	E	The average Mexican's purchasing power is reduced by 45 percent due to inflation.
1982-1992	E	Mexican Presidents de la Madrid and Salinas have to alienate strong labor unions associated with the PRI in order to turn Mexico's economy around.
1982-1992	E	Mexican Presidents de la Madrid and Salinas de Gortari turned a budget deficit into a surplus, privatized many state-owned industries, and reduce many trade barriers.
1982-1992	E	The number of state-owned Mexican firms declines from 1,555 to 217. Many are bought by foreign investors.
1982-1992	W	New (not maintenance) dredging at Mexican ports has been largely put on hold due to insufficient resources.
1983	E	President de la Madrid commits Mexico to a more open trade policy by eliminating temporary import controls and reinstating duty-free import provisions to the maquiladoras, which had been stopped in 1982.
1983	E	Mexico starts lifting trade barriers and its international commerce begins a new phase of growth.
1983	E	Mexican non-oil exports rebound.
1983	E	Mexico's annual inflation rate is almost 115 percent.
Post-1982	E	Manufactured goods surpass oil as the most important Mexican export sector.
Post-1982	T	Transportation costs have increased steadily since 1982.
1984	E	Mexican President de la Madrid's austerity program is successful and the country is now advancing towards a solid economic recovery.
1984	E	Significant trade liberalization measures were taken to encourage Mexican exports and provide access to crucial imported inputs.
1984	T	American President Lines establishes double-stack unit train service in the US.
1984	T	US Shipping Act of 1984 is adopted and, along with the 1980 deregulation of inland transport, removed bureaucratic constraints between modes of transport, improved productivity, and encouraged intermodalism.

1984	T	Mexico's newly completed trans-isthmus container transport system is underutilized due to a failure to upgrade the rail link as well as the world recession of the early 1980s.
1984	W	Mexican ports handle less than 100,000 TEUs.
Mid-1980s	E	Mexico's maximum tariff level is 100 percent.
Mid-1980s	T	In the US-Mexico trade, 11 truckloads of cargo move north for every 10 that move south due to high Mexican tariffs.
1984-1992	E	Mexico raises $22 billion through privatization of state assets and hopes to raise another $5 billion in 1993.
1984-1994	W	Mexico's corrupt and inefficient port system cause land border crossings to rapidly grow.
1984-1994	E	The world experiences a globalization of markets and economies. Many companies downsize to improve productivity. Technologically driven advances occur rapidly demanding constant change in the world marketplace.
1985	E	The Bilateral Agreement on Subsidies and Countervailing Duties is negotiated between the US and Mexico. This is the first in a series of bilateral trade talks.
1985	E	Mexico begins to phase out import licensing.
1985	E	US exports to Mexico total $3 billion.
1985	E	Mexico slowly begins opening its economy to world trade.
1985	E	The Mexican peso is devalued again to prevent further deterioration of Mexico's commodity balance.
1985	E	Mexican President de la Madrid initiates moderate import liberalization measures. Import licensing is partially replaced by tariffs.
1985	E	Less than half of Mexico's domestic production is now protected by import licenses compared to 100 percent protection in 1982.
1985	E	Mexico initiates ambitious trade reforms.
1985	E	Mexico experiences an economic boom.
1985	E	Mexico's trade is totally protected by tariffs, quotas, and licenses until 1985.
1985	E	Mexico radically opens its economy.
1985	T	Major Mexican highways are located primarily in the central part of the country and follow a north-south orientation along the mountains in the north.
1985	T	Roadway Express trucking begins operating in Mexico.
1985	W	Mexico has 12 major seaports, each handling over 1 million tons of international cargo in 1985.
1985-1989	E	Mexican import licenses are phased out to establish a more uniform type of protection through tariffs.
1986 July	E	When Mexico joins GATT, it agrees to replace official prices with tariffs by 1987 and then phase out tariffs later.
1986	E	Mexico joins the GATT negotiations, which indicates a clear shift from protectionism to more liberal trade policies. Mexico finally opens its economy.
1986	E	Mexico's inflation rate hits 180 percent.
1986	E	Mexico begins to open its economy in earnest.
1986	E	Oil prices fall sharply.
1986	E	The Mexican economy begins to recover.
1986	E	Mexico's non-petroleum exports (excluding maquiladora output) finally outpace its petroleum exports by value.
1986	E	For the first time, Mexico relies on the exchange rate to bring the balance of payments back into equilibrium instead of relying on additional import restrictions. This signifies Mexico's change in focus from short-term to long-term objectives.
1986	E	Mexico views its GATT membership as a way to promote private sector confidence in the government's commitment to liberalization.
1986	E	Public spending accounts for 50 percent of Mexico's GNP.
1986-1989	E	The average growth rate for maquiladora plants is 23 percent.
1986-1992	E	US exports to Mexico increase by 225 percent. US exports to the rest of the world rise by 97 percent during the same period. US imports from Mexico increase by 104 percent.
1986-1993	E	Mexico privatizes over 850 public enterprises out of 1,100 total.

1987 October	E	There is a world-wide stock exchange crisis.
1987 December	E	Mexico abolishes its uniform 5 percent surcharge on imports.
1987	E	The Mexican stock market collapses.
1987	E	Mexico's inflation rate is 159.2 percent.
1987	E	Mexico implements the Economic Solidarity Pact to minimize inflationary pressures with moderate price increases, controlling the rate of peso devaluation, and nominal wage rate readjustments.
1987	E	Mexico and the US sign an agreement on subsidies and countervailing duties.
1987	T	Union Pacific Railroad introduces 'BulkTainer' service (an intermodal tank container) to the US.
1987	W	In 1987, around 87 percent of total US liner cargo is hauled by cross-traders.
1987-1988	E	Mexican tariffs are reduced.
1987-1989	E	Mexico accelerates trade liberalization to get its economy out of a fiscal deadlock.
Late 1980s	E	The debt crisis begins to subside and Mexican sales improve.
1987-1994	E	The US-Mexico trade experiences 15 percent annual growth.
1988 July	E	Salinas de Gortari is elected as the next president of Mexico.
1988 December	E	Salinas de Gortari assumes the Mexican presidency.
1988	E	Mexican imports total 19.6 million tons.
1988	E	Mexico's annual inflation rate is over 177 percent.
1988	E	Mexico experiences a surge in consumer goods imports due to its new trade liberalization program and new worries about inflation appear.
1988	E	Mexico tries to alleviate its unsustainable balance of payments situation by promoting external capital inflows.
1988	E	Mexican President Salinas raises tariffs to cool the surge in consumer import goods.
1988	E	Mexico's inflation rate drops dramatically.
1988	E	The Mexican peso begins real appreciation.
1988	E	Around 70 percent of Mexico's savings go to either servicing debt or subsidizing state-run enterprises.
1988	E	President Salinas adopts an economic policy similar to those of the 1950s and 1960s. This policy, however, focuses on an export-oriented economy rather than import substitution and protectionism.
1988	E	The private sector regains a strategic role in the Mexican economy and is challenged to rationalize its resources to more effectively compete in the global marketplace.
1988	T	Thirty-six Mexican airports can handle international flights.
1988	T	Mexico's total domestic freight (516.71 million tons) is transported by the following modes: truck = 58 percent, water = 31 percent, rail = 11 percent, and air = <1 percent.
1988	W	Mexican ports handle 217,000 TEUs.
1988-1993	E	Almost 83 percent of the growth in US exports to Mexico is not re-exported but goes toward Mexican consumption.
1988-1993	W	Mexico has 76 ports throughout the period.
1988-1994	T	Mexico constructs over 4,000 kilometers of private toll roads.
1989 March	W	Puertos Mexicanos is established in Mexico to bring order to the country's decaying 14 primary ports in an effort to promote international trade. Three new ports are being built while four major container ports are being upgraded.
Early 1989	T	Mexico's rail volume begins to decline despite improvements in service and delivery times.
1989 July	T	Mexican trucking rapidly expands after deregulation.
1989	E	The Understanding Regarding Trade and Investment Facilitation Talks is signed in the US and Mexico.
1989	E	The Canada-US Free Trade Agreement goes into effect.
1989	E	Mexico changes foreign investment regulations to permit first securities investment followed by direct foreign investment.
1989	E	Mexico signs a debt-relief agreement.

1989	E	Mexico announces the re-privatization of the banking industry and real interest rates fall dramatically.
1989	E	Mexico passes a law giving a more liberal interpretation to the 1973 foreign investment law.
1989	T	The Mexican trucking industry is deregulated.
1989	T	Mexico begins opening up its transportation sector to limited private investment and management.
1989	T	The US Federal Highway Administration estimates that 34 percent of international container shipments could be overweight.
1989	W	The interests of the shipper now take precedence over those of liner shipping due to intense competition for goods in the international marketplace.
1989	W	President Salinas of Mexico initiates a $400 million port upgrade program.
1989-1990	E	The Mexican economy stabilizes further.
1989-1990	E	Mexico's growth in output rose to above 4 percent. This was much higher than the preceding five years.
1989-1991	E	Mexican exports grow by 19 percent while Mexican imports grow by 50 percent.
1989-1992	E	US pet food exports to Mexico grew from 3.01 million metric tons in 1989 to 6.37 million tons in 1992 and more than doubled in value to $5 million over the same period.
1989-1992	T	Mexico and the US forge a bilateral agreement opening the Mexican air cargo and charter market to foreign competition.
1989-1992	T	US containerized exports to Latin America triple.
1989-1992	T	Air cargo imports to the US from Mexico grow by 53 percent to $806 million and airborne exports to Mexico grew by 92 percent to $2.1 billion.
1989-1993	E	Major amounts of foreign capital flow into Mexico but most of this is liquid and can be easily removed.
1990 January	E	President Salinas visits Europe to promote investment in Mexico but the region is preoccupied with eastern Europe.
1990 April	T	Santa Fe Railroad initiates double-stack intermodal service with K-Line and Ferrocarriles Nacionales de Mexico or FNM between US West Coast ports and Mexico City.
1990 April	T	The first double-stack container train arrives at Mexico City's Pantaco intermodal yard.
1990 June	E	President Bush announces the Enterprise for the Americas Initiative to create a western hemisphere free trade region.
1990	E	An exchange of tax information agreement is signed between the US and Mexico.
1990	E	Mexico and the US express interest in negotiating a free trade agreement due, in part, to the lack of overall progress in GATT negotiations.
1990	E	Mexico's inflation rate is 30 percent.
1990	E	The average growth rate for maquiladora plants is 6 percent.
1990	E	Mexico re-negotiates its external debt with commercial banks.
1990	T	Southern Pacific offers double-stack rail service to Mexico.
1990	T	Intermodal traffic is rapidly increasing in both directions of the US-Mexico trade primarily because of new double-stack container services.
1990	T	President Salinas fires 90 percent of Mexico's customs officials in one day and immediately installs 3,100 well-educated, secretly trained replacements in an effort to combat corruption.
1990	W	The Mexican deep water Port of Ensenada is opened.
1991 January	E	In 1991, only 1.7 percent of Mexico's imports require a license.
1991 May	T	American President Co. initiates through rail service with Union Pacific and Ferrocarriles Nacionales de Mexico between the US Midwest and Mexico City.
1991 June	E	The US, Canada, and Mexico begin negotiating a North American free trade agreement.
1991 June	W	The Mexican government seizes the Port of Veracruz when it fails to submit a master plan for improving its productivity and efficiency. Union bosses are jailed, union contracts are canceled, and terminal operations concessions are opened to competition.
1991 June	W	The Mexican deep water Port of Topolobampo is opened.
1991 July	E	The US International Trade Commission is requested to conduct a study on the effects of a free trade agreement with Canada and Mexico

1991 July	W	Puertos Mexicanos begins improving port infrastructure in Veracruz.
1991 July	W	Puertos Mexicanos has received 71 requests totaling $3 billion from interested private investors.
1991 August	W	TMM begins its own stevedoring operation at the port of Veracruz to improve throughput efficiency.
1991 August	W	Fruit carriers in the Latin America-US trade operate as common carriers to fill empty cargo space on return voyages. This depresses freight rates due to the oversupply of capacity.
1991 August	W	Mexico passes a port law which requires all waterfront labor unions to disband and reorganize as new, private companies if they wish to provide stevedoring services.
1991 October	E	The European Community creates the European Economic Area, which includes 380 million consumers.
1991 December	W	Thompson Shipping begins hauling reefer cargo between Tampa and Progreso.
1991	E	38 US states rank Mexico as one of their top ten export markets.
1991	E	The Mexican government still sets the parameters for economic activity.
1991	E	Almost 50 percent of Mexico's imports consist of capital goods and imports are increasing at 20 percent annually.
1991	E	PEMEX is still Mexico's primary source of revenue.
1991	E	The economies of the industrialized nations begin to slow.
1991	E	Mexico begins opening up to turkey imports and demand has been rising ever since.
1991	T	Pantaco is now Mexico's number two container handling yard in TEUs following the Port of Veracruz.
1991	T	Rail cargo in the US-Mexico trade is around 3.5 million tons northbound and 10.8 million tons southbound.
1991	W	Mexico's port system handles 375,000 TEU containers. Puertos Mexicanos estimates this figure will be around 1 million TEUs by the year 2000.
1991	W	Puertos Mexicanos releases a report stressing the crucial role of the nation's port system in President Salinas' plan to generate economic growth by promoting non-petroleum exports.
1991	W	Puertos Mexicanos plans to spend $95 million this year on nine major port construction and maintenance projects. It also plans to spend another $42.5 million on port superstructure (i.e. equipment).
1991	W	Puertos Mexicanos reports a nationwide growth of 6.1 percent in container traffic.
1991	W	Canada's waterborne trade with Mexico is less than 1 million tons or .5 percent of the total trade.
1992 January	E	The Association of Southeast Asian Nations establishes a free trade area of 325 million consumers.
1992 February	E	Twelve technical papers are reviewed at a US International Trade Commission symposium and most of them agree that the US, Mexico, and Canada will benefit from a free trade agreement.
1992 March	T	Mexico initiates a $14 billion transportation upgrade program to improve its rail, highway, port, air, and communications systems.
1992 April	W	Theft is down ninety-nine percent at the Port of Veracruz since it was privatized in 1991. This is primarily due to improved pay incentives and the increased usage of containers.
1992 April	W	Lykes Lines begins direct, all-water container service between the US, Mexico, South America, and Europe.
1992 May	T	J.B. Hunt Trucking establishes a partnership with Mexican steamship company Transportacion Maritima Mexicana (TMM) to deliver its intermodal cargo throughout Mexico.
1992 August	E	NAFTA negotiations are completed.
Mid-1992	W	Transportacion Maritima Mexicana is listed on the New York Stock Exchange.
1992 September	W	Cool Carriers begins hauling break bulk reefer cargo (meat) from Australia to Mazatlan.
1992 September	W	Mexico transfers control of port privatization from the Ministry of Communications and Transport to the Ministry of Finance to speed up the process.
1992 November	T	APL Land Transport Services and CN North America begin a seamless Canada/US/Mexico container service.
1992 December	E	The US, Canada, and Mexico sign the North American Free Trade Agreement or NAFTA.

1992 December	T	Government and private investors spend $9.5 billion by the end of 1992 to upgrade the country's transportation infrastructure. Seventy percent of this figure is from private sources.
1992 December	W	Mexico announces plans to privatize major sectors of its national infrastructure including the port system.
1992	E	The US exported more than $75 billion in goods to Latin America's 444 million consumers.
1992	E	About 80 percent of Mexico's exports go to the US. Manufacturing earnings now outweigh petroleum earnings.
1992	E	Approximately 2,000 maquiladora plants are in operation.
1992	E	Mexico's dependence on marine oil wells is increasing.
1992	E	US exports to Mexico total $37 billion.
1992	E	Mexican imports rise 46 percent in four years to 28.7 million tons total.
1992	E	The average Mexican buys $450 worth of US-made goods.
1992	E	Cumulative foreign investment in Mexico doubles from $20 billion in 1987 to $40 billion in 1992.
1992	E	Mexico's economy is 1/27th the size of the US economy.
1992	E	In a typical year around 70 percent of Mexico's merchandise imports come from the US.
1992	E	A large portion of US-Mexico two-way trade is intra-firm.
1992	E	Maquiladora output generally has 50 percent Mexican content and 50 percent US content.
1992	E	The PRI has become associated with Mexico's economic failures and successes thus creating a credibility problem.
1992	E	Mexicans are clearly better off today than in 1988 due to trade liberalization.
1992	E	Mexico is becoming more and more decentralized, less corporatist, and economic reform is succeeding. It has shifted from a state-dominated structure to a market-oriented one.
1992	T	US Customs allocates over $300 million to upgrade border inspection stations and hire 386 new inspectors in the Southwest.
1992	T	For the first time, more US intermodal containers move by rail than by truck.
1992	T	The US enacts the Intermodal Surface Transportation Efficiency Act (ISTEA) to further integrate the country's transportation system.
1992	T	Mexico constructs 768 kilometers of new roads at a cost of $919 billion.
1992	T	Mexico allows US railroads to pre-clear commodities in a program called 'despachio previo' so that the paperwork is taken care of by the time the train arrives at the border.
1992	T	In the US-Canada trade, 85 percent of the cargo moves by land.
1992	W	Approximately 60 companies operate some 23,000 barges on US waterways.
1992	W	Mexico extends port service to 24 hours a day, 365 days a year and simplifies its port charge tariff system.
1992	W	Mexico and nine other Latin American countries implement a port state control program to ensure that 15 percent of ships entering their ports comply with IMO safety and pollution regulations by 1994.
1992	W	Mexico has four major container ports open for service.
1992	W	Average container throughput at specialized Mexican ports is up to 32 moves per ship per hour compared with 12 per hour in 1988. The goal is to reach 50 moves per hour.
1992	W	The Port of Singapore is providing training in Mexico's four major container ports.
1992	W	Mexico spends $126 million on port infrastructure upgrades.
1992	W	Discussions are taking place on extending the US Gulf Intra-coastal Waterway into Mexico. This plan, however, would take years to complete. Other options, such as short-sea routes, are also being considered.
1992	W	Mexican seaports handle nearly 450,000 TEUs.
1992	W	US ports handle an estimated 20 percent of Mexico's containerized trans-Pacific cargo.
1992	W	The ports of Veracruz, Altamira, Lazaro Cardenas, and Manzanillo handle about 73 percent of all container moves through the 15 Mexican ports capable of handling such shipments.
1992	W	Water transportation handles about 6 percent of US-Canada commerce.

1992	W	Only 8.5 percent of US-Mexico trade cargo moves by water transport.
1992-1994	E	Mexico is the largest importer of US apples and pears.
1993 February	W	Tropical Shipping begins liner service to Puerto Morelos near Cancun, Mexico.
1993 March	E	President Clinton begins negotiations with Mexico and Canada on side-agreements to NAFTA, such as labor and the environment, as a pre-condition to seeking congressional approval.
1993 March	T	US transport officials express concern about poor security in Mexico following a number of truck hijackings involving APL containers loaded with high value cargo.
1993 March	W	Lykes Lines adds St. John, New Brunswick to its Middle East, US, and Mexico run thus linking all three NAFTA countries with liner service.
1993 March	W	Lykes Lines is the only large US carrier providing water transport service to Mexico with its own vessels. Most others use slot charters with TMM, trucking, or double-stack rail service from US ports.
Early 1993	W	Cargo Transport Lines establishes liner service between Tampa and Veracruz.
1993 April	T	Roadway Package Service begins air cargo service to Mexico City, Guadalajara, and Monterrey.
1993 May	W	Burlington Northern provides a new rail barge service between Galveston, TX and Coatzacoalcos, Mexico. BN has no direct rail links to Mexico.
1993 June	W	SeaTruck RoRo begins roll-on/roll-off liner service between Galveston, Texas and Veracruz and Coatzacoalcos, Mexico.
1993 July	W	Mexican Gulf Line and KLLM Trucking announce a new container service between Gulfport, Miss. and Tuxpan, Mexico.
1993 July	W	President Salinas reveals a new 'Law of Ports' which sets up semi-autonomous integral port administrations or APIS to oversee administrative and operational activities at Mexican ports such as granting port services concessions to private interests.
1993 August	W	Mexico announces 27 private port concessions at 15 predominantly liquid and dry bulk terminals and also at a few general cargo terminals.
1993 October	W	Crowley American Transport begins direct service to Progreso, Veracruz, and Tampico from Port Everglades, FL.
1993 October	W	TMM and Hapag-LLoyd overhaul their combined Europe/US/Mexico service by deploying faster ships.
1993 October	W	Foreign interests may own up to 49 percent of semi-autonomous integral port administrations or APIS and 100 percent of port service companies.
1993 October	W	Mexico creates its first semi-autonomous integral port administration or APIS, which is similar to a US autonomous port district, at the fishing port of Puerto Madero.
1993 October	W	CSX de Mexico is granted concessions to build intermodal yards at the Mexican ports of Altamira and Veracruz.
1993 October	W	Marmex begins liner service between Long Beach and Topolobampo.
1993 October	W	K Line begins liner service between the US West Coast, Mexico, and Central America.
1993 November	E	US House of Representatives ratifies NAFTA.
1993 November	E	US Senate ratifies NAFTA.
1993 November	T	TMM is negotiating with APL to improve its intermodal connections in the US with APL's Stacktrain Services.
1993 November	T	The US Customs Modernization Act is passed in Congress. Customs can now implement its electronic import processing system called the National Entry Processing System.
1993 November	W	Mexico has granted 61 private marine terminal concessions to date.
1993 November	W	APL and TMM announce a vessel sharing joint-venture for containers moving between Asia and US/Mexico west coast ports. This provides the first fixed day, direct, all-water service between Mexico and Asia.
1993 November	W	Puertos Mexicanos receives 17 international bids for 8 state-owned dredges up for auction.
1993 December	E	Mexico begins issuing NAFTA implementation regulations in the Diario Oficial, which is similar to the US Federal Register.
1993 December	T	Mexico becomes one of the eighteen board members of the International Standards Organization. This should help Mexico end the use of local standards to protect domestic industry.
1993 December	T	In the US-Mexico trade, 5 truckloads of cargo move north for every 10 that move south creating a large trade imbalance.
1993 December	T	Mattel Inc. begins using the new US Customs Automated Invoice Interface system to speed its shipments through customs.

1993 December	T	APC de Mexico begins 'in-bond' service for less-than-container load (LCL) shipments in its Asia-Mexico operations.
1993 December	W	CSX Transportation plans to open intermodal terminals in Veracruz and Altamira in 1994 to facilitate a planned rail car/trailer on barge service from either Mobile or New Orleans.
1993 December	W	Mexico accepts bids for five maintenance dredging contracts to service major east and west coast ports.
1993 December	W	Mexican Gulf Line suspends liner service between Gulfport, Miss. and Mexico due to insufficient cargo volumes.
1993 December	W	The ports of Bellingham, WA and Ensenada, Mexico sign an agreement to increase commerce between the two ports.
1993	E	Mexico's austerity program is yielding results such as a reduced trade deficit, expanding industrial production, higher Mexican oil prices, lower interest rates, and a 16 percent inflation rate.
1993	E	Mexico is the United States' fastest growing export market at an average rate of 22 percent annually since 1988.
1993	E	Mexico passes new legislation, the Law On Economic Competitiveness, to promote free competition in the Mexican economy.
1993	E	Texas controls over 50 percent of US-Mexican trade.
1993	E	Maquiladora plants now account for 14 percent ($3.6 billion) of Mexico's exports to the US.
1993	E	The average Mexican tariff is 10 percent.
1993	E	The average US tariff is 4 percent.
1993	E	Around 54 percent of Mexico's population is under the age of 20.
1993	E	Mexico experiences record foreign investment but experts warn it must do more to attract capital not at risk for quick withdrawal.
1993	E	Total trade between Canada and Mexico is $3.5 billion and rising.
1993	E	US-Mexico trade is worth over $80 billion.
1993	T	Road transport accounts for 80 percent of Mexico's domestic freight traffic.
1993	T	Mexico has 243,000 kilometers of highways.
1993	T	Mexican infrastructure upgrade funding ($13.5 billion) is broken down as follows: highways = 56 percent, communications = 22 percent, railroads = 14 percent, seaports = 3 percent, and airports = 3 percent.
1993	T	APL Automotive Services uses Autostack container racks to ship autos from Mexico to Michigan.
1993	T	Federal Express offers direct air cargo service to nine cities throughout Mexico.
1993	T	Mexico plans to spend $1.48 billion on highway infrastructure upgrade programs.
1993	T	Transportation issues regarding the NAFTA countries are being addressed by the Transportation Working Group.
1993	T	Container hijackings and armed robberies in Mexico double from 1992 figures.
1993	T	Bridges handle over 70 percent of all US-Mexico commerce.
1993	T	Intermodal terminals are being constructed at Monterrey and Guadalajara to complement the one already in Mexico City.
1993	T	Over 1.7 million freight movements occur at the US-Mexico border.
1993	W	Mexico invests $110 million to upgrade port infrastructure.
1993	W	Latin America's container trade drastically improves due to lower trade barriers, product diversification, economic restructuring, and new services by liners such as Maersk and Sea-Land.
1993	W	Mexico's port infrastructure upgrade program is nearly complete and the focus is shifted to improving the administrative, regulatory, and operational aspects of the port system.
1993	W	A World-Wide Shipping survey indicates that shippers have a poor opinion of marine transportation compared to air, rail, and trucking.
1993	W	In the Canada-Mexico trade, waterborne transportation hauls 17 percent of the overall trade.
1993	W	The Port of Veracruz handles 193,862 TEUs.
1993	W	The Port of Altamira handles 68,755 TEUs.

1993	W	The Port of Lazaro Cardenas handles 59,610 TEUs.
1993	W	The Port of Manzanillo handles 50,915 TEUs.
1993	W	The Port of Tampico handles 30,200 TEUs.
1993	W	The Port of Salina Cruz handles 23,819 TEUs.
1993	W	The Port of Ensenada handles 12,049 TEUs.
1993	W	The Port of Tuxpan handles 2,820 TEUs.
1993	W	TMM and Del Monte form a joint venture to improve efficiencies in the latter's reefer vessel operations. The focus is on Del Monte's refrigerated produce with third party common carrier liner service for backhaul cargo.
1993	W	Mexico awards 62 marine terminal private concession contracts.
1993	W	About 177.2 million tons of freight move through Mexico's ports. Petroleum shipments make up 75 percent of this number and containers account for 16 percent.
1993	W	Mexican ports handle over 460,000 TEUs.
1993	W	Mexico's new Navigation Law somewhat relaxes cargo-sharing and cabotage restrictions to foreign interests.
1993	W	General cargo tonnage is increasing by 12 percent annually through Mexican ports.
1993	W	Mexican ports handle 29 percent of the country's total trade tonnage or 29 million tons.
1993-1994	W	Mexico awards two large dredging contracts covering the country's major ports to foreign companies.
1993-1994	W	CSX Corp. has no direct rail lines into Mexico and is still contemplating a $40 million rail/barge service to the country.
1994 January	E	NAFTA is implemented creating a free trade area of 360 million consumers with a combined gross domestic product of almost $6 trillion.
1994 January	E	Mexico is now one of the world leaders in low-cost manufacturing.
1994 January	E	Mexico's Law On Economic Competitiveness, which opens up many areas of the economy up to 100 percent foreign investment, is enacted.
1994 January	E	About one-half of all US goods can enter Mexico duty free provided they meet NAFTA's 'Rules of Origin' requirements.
1994 January	E	The Tri-Lateral Trade Commission is established to resolve trade disputes between the NAFTA members.
1994 January	T	Mexico announces a new $16.7 billion plan to upgrade the nation's transport and communications sectors. Around $11.5 billion will be financed through private sector projects.
1994 January	T	The Border Infrastructure and Facilitation Task Force holds its first meeting. Its purpose is to identify ways to make cross-border transportation more efficient and to plan future border infrastructure development.
1994 January	T	US-Mexico border traffic is snarled due to the cumulative effects of seemingly insignificant transport and customs problems not dealt with in NAFTA negotiations.
1994 January	T	Mexico plans to spend $10.7 billion on highway infrastructure upgrade programs.
1994 January	T	Mexico plans to spend $1.6 billion on railroad infrastructure upgrade programs.
1994 January	T	Mexico plans to spend $467 million on aviation infrastructure upgrade programs.
1994 January	T	Mexico plans to spend $3.1 billion on communications upgrade programs.
1994 January	W	Mexico plans to spend $600 million on port infrastructure upgrade programs.
1994 January	W	Cargo Transport Lines begins liner service in conjunction with KLLM Trucking between Gulfport, Miss. and Mexico along with its Miami and Tampa port calls.
1994 January	W	Canadian National signs an agreement with Burlington Northern to transport Mexican trade cargo by barge across the Gulf of Mexico.
1994 February	T	Mexico plans to privatize the nation's airports (only services - not administration). Airport officials are very interested in developing intermodal shipments.
1994 February	T	Morrison Knudson of Boise, ID wins the Mexican concession to service Ferrocarriles Nacionales de Mexico or FNM locomotives and rail cars in its northeast corridor.
1994 February	T	Mexico now allows trailers on flat cars or piggybacks to enter the country in-bond and be cleared at the final destination.
1994 February	W	Lykes Lines adds Boston to its Europe/US/Mexico run and provides New England shippers direct all-water liner service to Mexico. Its primary competition is rail and trucking. Limited direct, all-water service exists in the US Atlantic coast-Mexico trade.

1994 February	W	Maersk Lines begins a new Mexico/US Gulf/Jamaica liner service calling at Veracruz.
1994 February	W	Mexico announces two new Administraciones Portuarias Integrales or APIS at the ports of Veracruz and Manzanillo.
1994 March	E	US trade representatives meet with Mexican officials to discuss accelerating tariff reductions on many commodities such as wine, appliances, and glass.
1994 March	E	PRI (the ruling party in Mexico) presidential candidate Colosio is assassinated.
1994 March	T	The largest US customs broker association urges US Customs to hire more inspectors and trade specialists to handle increasing traffic at the US-Mexico border.
1994 March	T	APL plans to develop intermodal operations within Mexico in conjunction with Transportacion Maritima Mexicana and Ferrocarriles Nacionales de Mexico. Double-stack train service from Mexican ports to Mexico City and Guadalajara is the next priority.
1994 March	T	APL complains once again about cargo theft in Mexico after having 60 containers and trailers hijacked over the last two years. This is mainly high-value cargo from Asia such as televisions.
1994 March	W	Americas Marine Express, Inc. begins a new liner service between Memphis, Guatemala, and Progreso, Mexico. This is the first operation to utilize the US Maritime Administration study "Maritime System Of The Americas" concepts and recommendations.
1994 March	W	Mexico approves the ocean transport of US apples to the Port of Manzanillo. Dole Ocean Liner Express will handle the truck/ocean intermodal moves.
1994 March	W	Mexico considers a new law to streamline cargo inspections at the nation's ports to prevent delays from too many permit and approval requirements.
1994 March	W	The Port of Saint John, New Brunswick investigates all-water liner service to Mexico. Forest products are the cargo of focus.
1994 March	W	Sea-Land Service announces a new liner service to the Mexican ports of Manzanillo, Veracruz, and Altamira to develop intermodal moves within Mexico instead of intermodal moves to Mexico from US ports. The service includes a Maersk slot-sharing agreement.
1994 March	W	Because over 80 percent of Canada's trade with Mexico now moves over land, the impact of NAFTA on Canada-Mexico marine transportation will be minimal.
1994 March	W	Mexico announces it will phase out auto incentives for shippers using Mexican ocean carriers and will bring its fleet up to standards in order to join the Organization of Economic Cooperation and Development (OECD).
1994 April	W	Cargo Transport Lines begins a new liner service between Miami, Progreso, and Veracruz.
1994 April	W	A two-week old Teamsters Union strike in the US delays Sea-Land's first ever direct calls to the Mexican port of Manzanillo.
1994 April	W	US, Mexico, and Canada sign a maritime agreement primarily designed as a framework for sharing information.
1994 May	T	Mexican Customs allows Union Pacific and Ferrocarriles Nacionales de Mexico or FNM to haul trailers on flat cars (TOFC) in-bond to the Pantaco intermodal yard in Mexico City.
1994 May	W	Sea-Land Service is seeking Mexican port operation concessions with a Mexican partner in Veracruz, Altamira, Manzanillo, and Lazaro Cardenas.
1994 May	W	APL and TMM begin a joint weekly, fixed-day, all-water container service between Asia and Mexican Pacific coast ports to avoid double customs entries from intermodal moves out of US ports.
1994 May	W	TMM and APL offer 'door-to-door' liner service with their new Asia-North America joint-venture.
1994 May	W	Maersk Line begins dedicated, fully containerized, liner service between Houston and Veracruz.
1994 July	T	Mexico begins electronic data transmission of customs information to Mexican customs brokers.
1994 July	W	Cargo Transport Lines temporarily halts its US-Mexico liner service to re-structure its management.
1994 August	E	Ernesto Zedillo of the ruling PRI party wins Mexico's presidential election.
1994 September	E	NAFTA has already increased US-Mexico trade by 20 percent.
1994 September	W	Mexico completes its two-year process of decentralizing the state-controlled ports into semi-autonomous integral port administrations or APIS.
1994 October	T	Mexico opens its new intermodal rail facility in Monterrey.
1994 October	T	Ferrocarriles Nacionales de Mexico, Mexico's state-run railway, continues to lose cargo to trucking, which provides better customer service and faster delivery times.

1994 October	T	Mexico considers expropriating land along the US border to build new roads in an effort to alleviate congestion.
1994 October	T	Burlington Air Express begins operating out of Mexico City and Guadalajara. Its major competitors are Emery Worldwide, United Parcel Service, Federal Express, Air Express International, and Panalpina.
1994 October	W	Burlington Northern terminates its US-Mexico rail/barge service citing an inability to lower costs and being unable to raise rates. It failed because the predominant cargo was grain, a low-value commodity that was unable to generate sufficient revenue.
1994 October	W	CSX backs off from its plans to begin a rail/barge service between the US and Mexico.
1994 October	W	A researcher at Louisiana State University says that small, roll-on/roll-off vessels called 'coasters' could effectively move containers and trailers between the US East and Gulf Coasts, Canada, and Mexico.
1994 October	W	Cargo Transport Lines reinstates its US-Mexico liner service.
1994 October	W	Delays in Mexican rules for port privatization frustrate potential investors and cause facility neglect at the ports as interested parties take a wait-and-see approach.
1994 October	W	Carriers interested in the US-Mexico trade complain that new APIS administrators are the same people from the old federal port agency, Puertos Mexicanos, and have a hard time grasping the concept of competition.
1994 October	W	Carriers are interested in operating highly profitable Mexican container terminals but APIS administrators are not obligated to grant these concessions. They may retain control even though the carrier could do a better job.
1994 October	W	The prize Mexican container ports of Veracruz, Altamira/Tampico, Manzanillo, and Lazaro Cardenas have yet to be offered up for private operation.
1994 November	E	Mexico's President Salinas leaves office.
1994 November	E	Inflation in Mexico is 7.5 percent compared to 180 percent in 1988.
1994 December	E	President Zedillo takes office in Mexico replacing President Salinas.
1994 December	E	Foreign investment in Mexico reaches $52 billion.
1994 December	E	Mexico is printing too much money to artificially prop up the peso in the international market. US Treasury and IMF economists advise President Zedillo to abandon protecting the peso. He announces that the peso will no longer be pegged to the dollar.
1994 December	E	The Mexican peso drops in value by 15 percent under financial pressures and the Mexican stock market immediately loses 3 percent of its value. This begins Mexico's second major currency crisis.
1994 December	E	Mexico decides to let its peso float, which subsequently drops in value by 39 percent. Capital flight ensues due to the highly liquid nature of foreign investments in Mexico. President Zedillo fires his finance minister.
1994 December	T	Latin America is still unable to independently finance its crucial transportation infrastructure and thus remains dependent on foreign investments.
1994 December	T	Mexico has 69 transportation projects in the works requiring $13.6 billion in investments.
1994 December	T	Shippers and carriers once again complain about armed cargo theft in Mexico and Guatemala. Joint lobbying efforts may be the only way to bring about change.
1994 December	W	The recent peso devaluation makes Mexican exports more desirable and TMM expects its trade between the US and Mexico to increase.
1994 December	W	Dole cancels its Manzanillo port call due to time constraints in Ecuador leaving Washington apple growers without an all-water route to Mexico.
1994 December	W	The Mexican steamship line, TMM, is relatively unhurt by the peso devaluation because its cash position is 100 percent in US dollars.
1994	E	NAFTA phases out tariffs which are now permitted to be significantly increased under GATT.
1994	E	US exports to Mexico average $1 billion per week between May and December.
1994	E	Foreign investors control one-fourth of Mexico's largest corporate enterprises.
1994	E	Economic growth forecasts for Mexico are bleak.
1994	E	Mexico's reputation to foreign investors is hurt by the peasant uprising in Chiapas and the assassination of two prominent political figures.
1994	E	Shippers in the US-Mexico trade focus more on NAFTA than GATT.
1994	E	Since NAFTA went into effect on January 1st, trade between Mexico and the US has risen to record levels. Mexican exports grew faster than US exports cutting the US trade surplus by 45.1 percent.

1994	E	Since NAFTA went into effect, major problems have arisen in regard to labeling requirements, certificates of origin, and product standards.
1994	E	Mexico is trying to bring its regulations up to international standards as quickly as possible sometimes to the dismay of those involved in US-Mexico trade.
1994	E	Mexico has privatized 415 state-owned enterprises to date.
1994	E	Importers and exporters in the US-Mexico trade complain of excessive regulations and abrupt rule changes by the Mexican government since NAFTA took effect.
1994	E	Mexico's population is 87 million.
1994	E	Productivity at maquiladora plants is up by an estimated 5.2 percent.
1994	E	Around one-third of Mexicans live in urban areas. Of these, 39 percent can afford consumer-ready products while another 22 percent have the desire to buy imported consumer products.
1994	E	US-Mexico reaches a record $92 billion.
1994	E	The Maritime Administration says that inter-America trade is the fastest growing sector of US commerce.
1994	T	The $375 million US Capital Improvement Program, designed to upgrade US-Mexico border infrastructure, nears completion.
1994	T	US trucking firms are having a hard time finding backhaul cargo from Mexico because of difficulties in re-positioning equipment.
1994	T	US railroads are having a difficult time finding backhaul cargo from Mexico because the north-south rail lines are not as developed as east-west lines. It is hard to re-position equipment for backhauls.
1994	T	Burlington Air Express has air cargo service to 13 Mexican airports.
1994	T	Union Pacific Railroad expands its 'BulkTainer' service (an intermodal tank container) throughout Mexico.
1994	T	Cargo shipments into Mexico are still limited but container traffic is increasing.
1994	T	Ferrocarriles Nacionales de Mexico is again considering upgrading the trans-isthmus rail link between Coatzacoalcos and Salina Cruz, Mexico to compete with the Panama Canal for intermodal traffic.
1994	T	Downsizing and occasional rail equipment shortages keep some intermodal joint-ventures from being implemented in the US-Mexico trade.
1994	T	Intermodalism is the fastest growing sector of rail transportation.
1994	T	Shippers today demand consistent, zero-defect deliveries from transport companies.
1994	T	Mexico's shipping companies are popular targets for foreign joint-ventures.
1994	T	Rail is increasing its market share in the US-Mexico trade.
1994	T	Canadian National Railway expects to haul over 30,000 containers in the Canada-Mexico trade by the end of the year.
1994	T	APL expresses interest in marketing FNM unit trains and becoming more involved in port management operations in Mexico. This is a major shift in focus from its intermodal system in the US-Mexico trade.
1994	T	Mexico opens its new intermodal rail facility in Guadalajara.
1994	T	President Salinas states that FNM, Mexico's state-owned railway, is a disaster and there is no justification for keeping it under state control regardless of constitutional restrictions to the contrary.
1994	T	Air cargo transport to Mexico is still hampered by a requirement that consolidated shipments be cleared through customs at the first point of entry before disbursement instead of permitting in-bond shipments.
1994	T	Mexican cabotage laws still prohibit non-Mexican rail and truck lines from operating in Mexico.
1994	T	One gallon of diesel fuel can move one ton of cargo 59 miles by truck, 202 miles by rail, and 514 miles by barge.
1994	T	Mexico has 29,000 miles of federal highways. Only 15 percent are in excellent condition, 57 percent are in average condition, and 28 percent are in poor condition.
1994	T	The Mexican government is planning to construct a 7,240 mile network of superhighways to link up the countries major ports with primary industrial and commercial centers. Over 1,000 miles of this network are now complete.
1994	T	The 3 major US railroads doing business with Mexico are Union Pacific, Santa Fe, and Southern Pacific.
1994	W	Mexico spends $30 million to liquidate union contracts at ten of the country's ports up for privatization in order to improve throughput efficiency.

1994	W	Mexico has 73 ports of various size and function.
1994	W	APL says it will phase out cross-country general cargo container movements to the US-Mexico border by replacing them with direct calls to Mexican ports. This will be done to improve efficiency and minimize the threat of cargo theft.
1994	W	Transportacion Maritima Mexicana (TMM) is Mexico's largest integrated transport company.
1994	W	Mexico has 18 deep-water commercial ports.
1994	W	The Mexican ports of Veracruz, Manzanillo, Lazaro Cardenas, Progreso, Puerto Madero, Tampico, Acapulco, Altamira, Guaymas, and Chetumal are taken over by semi-autonomous integral port administrations (APIS).
1994	W	Steamship lines now emphasize shipping cargo to Mexico by all-water routes instead of using their intermodal connections. This signifies a major change in the way carriers view the Mexican port system which is now effectively functional.
1994	W	The Mexican government will continue to own existing port infrastructure, water areas, and waterfront property but their use, development, and exploitation will be open to private concessions.
1994	W	US-Mexico waterborne shuttle services experience difficulties competing with trucking and rail due to the latters' quicker delivery times to Mexico City, Guadalajara, and Monterrey. Finding northbound cargo is also a big problem.
1994	W	Mexican port privatization (i.e. awarding of port concessions) gets bogged down when the semi-autonomous integral port administrations (APIS) cannot decide who should get the concessions.
1994	W	Asia is the largest exporter to Mexico by ocean transport.
1994	W	Mexico liquidates its centralized port authority, Puertos Mexicanos, and turns over administration of the country's ports to semi-autonomous port authorities or APIS administrations.
1994	W	Mexico awards dozens of private marine terminal concessions for the first time ever.
1995 January	E	The US buys up pesos in an effort to stop the currency's slide. The crisis worsens. President Clinton extends Mexico a $9 billion line of credit.
1995 January	E	The US $9 billion line of credit is insufficient, so the US begins negotiating a $40 billion credit package with Mexico in an effort to save its economy. The US Congress, however, is expressing early disapproval of the measure.
1995 January	E	The Mexican economy is headed for a recession.
1995 January	E	Many US retailers say they will continue to move ahead with plans to increase their presence in Mexico despite the peso crisis.
1995 January	T	The Pantaco intermodal yard in Mexico City begins backing up.
1995 January	T	US Customs begins the most sweeping change in its history to implement the 1993 Customs Modernization And Informed Compliance Act to handle increasing US commerce.
1995 January	T	It is projected that Mexico will spend from $20 billion to $50 billion by the year 2010 on new roads, bridges, border crossings, ports, and other infrastructure projects.
1995 January	T	Mexico finally amends Article 28 of its constitution to remove the state-owned railway, FNM, from the strategic national asset list. This will effectively permit private investment in the railroad although the level of privatization is still pending.
1995 January	T	US railroads such as UP and SP are interested in Mexico's north-south rail lines while some steamship lines may be interested in east-west rail links from the Ports of Manzanillo or Veracruz to Mexico City.
1995 January	T	The Mexican air carrier, Mexicana de Aviacion, is in severe financial trouble due the peso crisis, huge debts, increasing competition, and high operating costs.
1995 January	T	The global airline industry begins coming out of a four-year slump.
1995 January	T	The Mexican government approves a constitutional amendment to take FNM off the country's list of strategic industries. This will finally permit foreign investment in the inefficient railroad. US railroads and ocean-liners are interested in concessions.
1995 January	W	Shippers cancel orders due to the peso devaluation and cargo delays occur at Mexican ports as many consignees hold off accepting goods already shipped. This is tying up containers needed for outbound shipments.
1995 January	W	Mexican shipping agents worry that steamship lines will eventually cut back service to Mexico due to the Mexican currency crisis and reduced demand by Mexican consumers.
1995 January	W	Liner service in the US-Mexico trade is expected to be negatively affected by the peso devaluation. TMM, however, also expects its charter service in minerals and commodities to increase. TMM may also change its vessel rotations in the liner trade.

1995 January	W	Mexico announces an accelerated program for privatizing port concessions at the country's four major container ports to raise $200 million urgently needed capital. Bidding rules for these concessions are due out in February 1995.
1995 January	W	Sea-Land has the most frequent liner service to the Port of Manzanillo and is interested in bidding on concessions at the terminal.
1995 January	W	APL, a major carrier serving Mexico, is interested in bidding on Mexican port concessions at the major container terminals.
1995 January	W	It is still unclear whether carriers calling at Mexican ports will be permitted to bid on terminal concessions.
1995 February	E	President Clinton puts together a $47.8 billion multilateral (including the IMF and Japan) financial aid package for Mexico. He sidestepped Congress with executive authority to expedite delivery. The aid removes a key market uncertainty for investors.
1995 February	W	Marine terminal operators in Mexico set up a new association called Asociacion Nacional de Terminales Maritimas y Portuarias to have a collective voice in resolving legal, administrative, governmental, and operational issues. It will negotiate with APIS.
1995 February	W	The Japanese firm, Tomen America Inc., signs a joint-venture agreement with Bunkers de Mexico to provide marine fuel to the Mexican Pacific Ports of Acapulco, Lazaro Cardenas, and Manzanillo under the latter firm's new port concession to supply bunkers.
1995 February	W	Mexico has awarded over 116 private port concessions since 1993.
1995 February	W	Ivaran Lines, Nacional Line, and Transportacion Maritima Mexicana announce a new vessel sharing service between the US Gulf Coast, Mexico, and South America.
1995 March	E	Mexico undertakes drastic austerity measures to turn its economy around. The peso begins to rise in value
1995 March	W	Mexico finally announces port concession bidding rules for its four largest container ports after two years of delays.
1995 March	W	CSX formally shelves its long proposed cross-Gulf rail/barge service to Mexico citing insufficient projected volumes.
1995 March	W	Lykes Lines and Maersk Line discuss a cross-Gulf slot-sharing arrangement to allow the latter to continue liner service to the Mexican Gulf Coast. Maersk is planning to terminate its direct service to Veracruz.
1995 April	T	Mexico plans to begin constructing an intermodal rail link from the west coast port of Mazatlan into Mexico City to expedite container deliveries.
1995 December	T	Vehicle standards of NAFTA countries are to be compatible.
1995 December	T	US and Canadian trucking companies will be allowed to invest in Mexican trucking firms for the first time.
1995	E	Mexico pledges to open up its energy industry to private investors to raise 7.3 billion in urgently needed capital.
1995	E	Inflation in Mexico is anticipated to reach 20 percent.
1995	T	Cross-border ownership of transport companies will be permitted which is crucial to making shipments between the US and Mexico truly 'seamless'.
1995	T	Mexico's business community now considers the railroad to be the weak link in the country's transportation network.
1997 January	T	Motor carriers from the US and Mexico will begin hauling cargo in each other's border states.
2000 January	T	Motor carriers from the US and Mexico will begin hauling cargo throughout each other's territory.
2008	E	All goods in the US-Mexico trade will be tariff-free.

E = Economic/Political Event
T = Transportation/Geographical Event (excluding waterborne transportation)
W = Waterborne Transportation Event

Sources: See Appendix B, p. 335 for a list of general literature reviewed.

APPENDIX G

3-DIGIT SITC COMMODITY CATEGORIES
(INCLUDED IN THE STUDY)

011	MEAT OF BOVINE ANIMALS, FRESH, CHILLED OR FROZEN
012	MEAT NES & EDIBLE OFFAL, FRSH, CHLD, FROZ
016	MEAT, EDIBLE OFFAL, SALTED, DRIED, SMK, FLOUR, ETC.
017	MEAT & EDBL MEAT OFFAL PREPARED OR PRESERVED NES
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
023	BUTTER AND OTHER FATS AND OILS DERIVED FROM MILK
024	CHEESE AND CURD
025	BIRDS' EGGS & YOLKS, FRSH, DRIED, PRES, EGG ALBUMIN
034	FISH, FRESH (LIVE OR DEAD), CHILLED OR FROZEN
035	FISH, DRIED, SALTED OR IN BRINE, SMOKED FISH
036	CRUSTACEAN ETC. FRSH, CHLD, FROZ, DRIED, SALTED, ETC.
037	FISH/CRUSTACEANS/MOLLUSKS/AQ INVBRTE PREP/PRES NES
046	MEAL AND FLOUR OF WHEAT AND FLOUR OF MESLIN
047	CEREAL MEALS AND FLOURS, NES
048	CEREAL PREPS & PREPS OF FLOUR OR STARCH OF FRTS OR VEGS
054	VEGS FRSH, CHLD, FROZ, ROOTS, TUBERS ETC. FRESH, DRIED
056	VEGS, ROOTS AND TUBERS, PREPARED OR PRESERVED, NES
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
058	FRUIT PRSRVD, FRUIT PREPARATIONS (EXCL FRUIT JUICE)
059	FRUIT/VEG JUICES UNFERMENTED NOT INCL ADDED SPIRIT
062	SUGAR CONFECTIONERY
071	COFFEE AND COFFEE SUBSTITUTES
072	COCOA
073	CHOCOLATE & OTHER FOOD PREPARATIONS CTNG COCOA NES
074	TEA AND MATE
075	SPICES
081	FEEDING STUFF FOR ANIMALS NOT INCL UNMILLED CEREAL
091	MARGARINE AND SHORTENING
098	EDIBLE PRODUCTS AND PREPARATIONS, NES
111	NON-ALCOHOLIC BEVERAGES, NES
112	ALCOHOLIC BEVERAGES
121	TOBACCO, UNMANUFACTURED, TOBACCO REFUSE
122	TOBACCO, MFG WHETHER CONTAINING TOBACCO SUBSTITUTE
211	HIDES & SKINS (EXCEPT FURSKINS), RAW
212	FURSKINS, RAW
231	NATURAL RUBBER IN PRIMARY FM OR PLTS, SHTS OR STRP
232	SYN RUBBER, RECLM RUB, WASTE ETC. OF UNHARDND RUBBER
244	CORK, NATURAL, RAW & WASTE (INCL BLOCKS OR SHEETS)
245	FUEL WOOD (EXCLUDING WOOD WASTE) & WOOD CHARCOAL
246	WOOD IN CHIPS OR PARTICLES AND WOOD WASTE
247	WOOD IN THE ROUGH OR ROUGHLY SQUARED
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
251	PULP AND WASTE PAPER
261	SILK TEXTILE FIBERS
263	COTTON TEXTILE FIBERS
264	JUTE ETC. TEXT FIBERS NES, RAW, PROC, TOW & WASTE

265 VEG TEX FIBERS, RAW OR PROC BUT NOT SPUN, WASTE
266 SYNTHETIC FIBERS SUITABLE FOR SPINNING
267 MANMADE FIBERS NES FOR SPINNING, MANMADE FIBER WASTE
268 WOOL & OTHER ANIMAL HAIR (INCLUDING WOOL TOPS)
269 WORN CLOTHING & OTHER WORN TEXTILE ARTICLES, RAGS
515 ORGANO-INORGANIC & HETEROCYCLIC COMPOUNDS ETC.
516 ORGANIC CHEMICALS, NES
522 INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
523 METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
524 INORGANIC CHEMICALS NES, PRECIOUS METAL COMPOUNDS
525 RADIOACTIVE AND ASSOCIATED MATERIALS
531 SYNTHETIC ORGANIC COLORING MATTER, COLOR LAKES ETC.
532 DYEING & TANNING EXTRACTS, SYNTH TANNING MATERIALS
533 PIGMENTS, PAINTS, VARNISHES AND RELATED MATERIALS
541 MEDICINAL ETC. PRODUCTS, EXCEPT MEDICAMENTS
542 MEDICAMENTS (INCLUDING VETERINARY MEDICAMENTS)
551 ESSENTIAL OILS, PERFUME AND FLAVOR MATERIALS
553 PERFUMERY, COSMETICS OR TOILET PREPS, EXCEPT SOAPS
554 SOAP, CLEANSING AND POLISHING PREPARATIONS
571 POLYMERS OF ETHYLENE, IN PRIMARY FORMS
572 POLYMERS OF STYRENE, IN PRIMARY FORMS
573 POLYMERS OF VINYL CHLORIDE & OTHER HAL OLEFINS ETC.
574 POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
575 PLASTICS, NES, IN PRIMARY FORMS
581 TUBES, PIPES AND HOSES OF PLASTICS
582 PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
583 MONOFIL, CR-SECT OV 1 MM, RODS ETC., OF PLASTICS
591 INSECTICIDES, DISINFECTANTS ETC., RETAIL PACKED ETC.
592 STARCHES, INULIN & WHEAT GLUTEN, ALBUMIN SUBST, GLUES
593 EXPLOSIVES AND PYROTECHNIC PRODUCTS
597 ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
598 MISCELLANEOUS CHEMICAL PRODUCTS, NES
611 LEATHER
612 MFR OF LEATHER (INC COMPOSITION) NES, SADDLERY ETC.
613 FURSKINS (AND PIECES), TANNED OR DRESSED
621 MATERIALS OF RUBBER (PASTES, PLATES, SHEETS, ETC.)
625 RUBBER TIRES, INTER TREADS, TIRE FLAPS & INNER TUBES
629 ARTICLES OF RUBBER, NES
633 CORK MANUFACTURES
634 VENEERS, PLYWOOD, PARTICLE BRD, OTHER WORKED WOOD NES
635 WOOD MANUFACTURES, NES
641 PAPER AND PAPERBOARD
642 PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
651 TEXTILE YARN
652 COTTON FABRICS, WOVEN (NOT NARROW OR SPEC FABRICS)
653 WOVEN FABRICS, MAN-MADE TEXT MAT (NOT NARROW OR SPEC FAB)
654 WOVEN FABRICS OF TEXT MAT NOT COTTON OR MANMADE
655 KNITTED OR CROCHETED FABRICS, NES
656 TULLES, LACE, EMBROIDERY, RIBBONS, TRIMMINGS, ETC.
657 SPECIAL YARNS, SPECIAL TEXTILE FABRICS, ETC.
658 MADE-UP ARTICLES OF TEXTILE MATERIALS, NES
659 FLOOR COVERINGS, ETC.
662 CLAY AND REFRACTORY CONSTRUCTION MATERIALS

663 MINERAL MANUFACTURES, NES
664 GLASS
665 GLASSWARE
666 POTTERY
667 PEARLS, PRECIOUS & SEMIPRECIOUS STONES
676 IRON & STEEL BARS, RODS, ANGLES, SHAPES & SECTIONS
678 IRON AND STEEL WIRE
679 IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
681 SILVER, PLATINUM & OTHER PLATINUM GROUP METALS
691 METAL STRUCTURES & PARTS NES IRON, STEEL, ALUMINUM
692 METAL CONTAINERS FOR STORAGE OR TRANSPORT
693 WIRE PRODUCTS (EXCL INSUL ELECT WR) & FENCING GRILLS
694 NAILS, SCREWS, NUTS ETC., IRON, STEEL, COPPER, ALUMIN
695 TOOLS FOR USE IN THE HAND OR IN MACHINES
696 CUTLERY
697 HOUSEHOLD EQUIPMENT OF BASE METAL, NES
699 MANUFACTURES OF BASE METAL, NES
711 STEAM OR OTH VAPOR GENERATING BOILERS, ETC.
712 STEAM TURBINES & OTH VAPOR TURBINES, & PTS THEREOF
713 INTERNAL COMBUSTION PISTON ENGS, AND PTS, NES
714 ENGS AND MOTORS, NONELECT & PTS, NES
716 ROTATING ELECTRIC PLANT AND PARTS THEREOF, NES
718 POWER GENERATING MACHINERY & PARTS, NES
721 AGRICULTURAL MACHINERY (EXCL TRACTORS) & PARTS
724 TEXTILE & LEATHER MACHINERY & PTS THEREOF NES
725 PAPER MILL AND PULP MILL MACH, PAPER CUTTING MACH
726 PRINTING & BOOKBINDING MACHINERY, & PARTS THEREOF
727 FOOD-PROCESSING MACHINES (EXCLUDING DOMESTIC)
728 MACHRY ETC. SPECIALIZED FOR PARTICULAR INDUSTRIES NES
731 MACH TOOLS WORKING BY REMOVING METAL OR OTH MATERIAL
733 MACHINE TOOLS FOR WORKING BUT NOT REMOVING METAL
735 PARTS, NES & ACCESS FOR METAL WORK MACHINE TOOLS
737 METALWORKING MACHINERY, AND PARTS THEREOF, NES
741 HEATING & COOLING EQUIPMENT AND PTS THEREOF, NES
742 PUMPS FOR LIQUIDS, LIQUID ELEVATORS & PTS
743 PUMPS, AIR OR OTHER GAS COMPRESSORS AND FANS
744 MECHANICAL HANDLING EQUIPMENT, & PTS THEREOF, NES
745 NONELECTRICAL MACHINERY, TOOLS, APPARAT & PTS, NES
746 BALL OR ROLLER BEARINGS
747 TAPS, COCKS, VALVES & SIMILAR APPLIANCES
748 TRASMISSION SHAFTS AND CRANKS, BEARNG HOUSNGS, ETC.
749 NONELECTRIC PARTS & ACCESSORIES OF MACHINERY NES
751 OFFICE MACHINES
752 AUTOMATIC DATA PROCESS MACHINES & UNITS THEREOF
759 PARTS ETC. FOR OFFICE MACH & AUTO DATA PROCESS MACH
761 TELEVISION RECEIVERS
762 RADIOBROADCAST RECEIVERS
763 SOUND RECORDERS, TV RECORDERS, PREPARED UNRECORDED MEDIA
764 TELECOMMUNICATIONS EQUIPMENT, NES & PTS, NES
771 ELECTRIC POWER MACHINERY, AND PARTS THEREOF
772 ELECTRICAL APPARAT FOR SWITCHG OR PROTECTG ELEC CIRC
773 EQUIPMENT FOR DISTRIBUTING ELECTRICITY, NES
774 ELECTRO-DIAGNOSTIC APPARATUS

775	HOUSEHOLD TYPE ELEC & NONELEC EQUIPMENT, NES
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
778	ELECTRICAL MACHINERY AND APPARATUS, NES
784	PARTS AND ACCESSORIES OF MOTOR VEHICLES, ETC.
785	MOTORCYCLES AND CYCLES, MOTORIZED & NOT MOTORIZED
811	PREFABRICATED BUILDINGS
812	SANITARY, PLUMBING & HEATING FIXTURES & FITTINGS NES
813	LIGHTING FIXTURES AND FITTINGS NES
821	FURNITURE & PTS, BEDDING, MATTRESSES, ETC.
831	TRUNKS, SUITCASES, VANITY CASES, BRIEFCASES, ETC.
841	MEN'S OR BOYS' COATS, JACKETS ETC., TEXT, NOT KNIT
842	WOMEN'S & GIRLS' COATS, CAPES ETC., TEX FABRIC, NOT KNIT
843	MEN'S OR BOYS' COATS, JACKETS ETC., TEXT, KNITTED
844	WOMEN'S OR GIRLS' COATS, CAPES ETC., TEXTILE, KNIT
845	ARTICLES OF APPAREL OF TEXTILE FABRICS NES
846	CLOTHING ACCESSORIES, OF TEX, KNIT OR NOT, EXCL BABIES
848	APPAREL & CLOTH ACC EXCL TEXTILE, HEADGEAR OF ALL MATER
851	FOOTWEAR
871	OPTICAL INSTRUMENTS AND APPARATUS, NES
872	INST & APPLIANCES, NES, FOR MED, SURG, DENT, OR VET PURP
873	METERS AND COUNTERS, NES
874	MEASURING/CHECKING/ANALYZING & CONTROL INST & APPARAT NES
881	PHOTOGRAPHIC APPARATUS AND EQUIPMENT, NES
882	PHOTOGRAPHIC AND CINEMATOGRAPHIC SUPPLIES
883	CINEMA FILM, EXPOSED & DEVLOPED, INCLUDING SOUND TRACK
884	OPTICAL GOODS, NES
885	WATCHES AND CLOCKS
891	ARMS AND AMMUNITION
892	PRINTED MATTER
893	ARTICLES, NES OF PLASTICS
894	BABY CARRIAGES, TOYS, GAMES AND SPORTING GOODS
895	OFFICE AND STATIONARY SUPPLIES, NES
896	WORKS OF ART, COLLECTORS' PIECES AND ANTIQUES
897	JEWELRY, GOLDSMITHS' & SILVERSMITHS' WARES ETC.
898	MUSICAL INSTRUMENTS AND PARTS, RECORDS, TAPES ETC.
899	MISCELLANEOUS MANUFACTURED ARTICLES, NES
950	COIN INCLUDING GOLD, PROOF AND PRESENTATION SETS
961	COIN (OTHER THAN GOLD COIN) NOT BEING LEGAL TENDER
971	GOLD, NONMONETARY (EXCLUDING ORES & CONCENTRATES)

Sources: US Department Of Commerce (1989 and 1993b) and United Nations (1986)

APPENDIX H

3-DIGIT SITC COMMODITY CATEGORIES
(EXCLUDED FROM THE STUDY)

001	LIVE ANIMALS OTHER THAN ANIMALS OF DIVISION 03
041	WHEAT (INCLUDING SPELT) AND MESLIN, UNMILLED
042	RICE
043	BARLEY, UNMILLED
044	MAIZE (NOT INCLUDING SWEET CORN) UNMILLED
045	CEREALS, UNMILLED EXCEPT WHEAT, RICE, BARLEY, MAIZE
061	SUGARS, MOLASSES AND HONEY
222	OIL SEEDS/OLEAGINOUS FRUIT FOR EXTRACT SOFT FIX VEG OIL
223	OIL SEEDS, OLEAGINOUS FRUIT FOR EXTRACT FIXED VEG OIL
272	FERTILIZER, CRUDE, OTHER THAN THOSE OF DIVISION 56
273	STONE, SAND AND GRAVEL
274	SULFUR AND UNROASTED IRON PYRITES
277	NATURAL ABRASIVES NES (INCL. INDUSTRIAL DIAMONDS)
278	CRUDE MINERALS, NES
281	IRON ORE AND CONCENTRATES
282	FERROUS WASTE & SCRAP, REMELTING IRON OR STEEL INGOTS
283	COPPER ORES & CONCENT, COPPER MATTES, CEMENT COPPER
284	NICKEL ORES & CONCENT, NICKLE MATTES, OXIDE, SINT, ETC.
285	ALUMINUM ORES & CONCENTRATES (INCLUDING ALUMINA)
287	ORES & CONCENTRATES OF BASE METALS, NES
288	NONFERROUS BASE METAL WASTE & SCRAP, NES
289	ORES & CONCENT OF PRECIOUS METAL & WASTE, SCRAP ETC.
291	CRUDE ANIMAL MATERIALS, NES
292	CRUDE VEGETABLE MATERIALS, NES
321	COAL, PULVERIZED OR NOT, BUT NOT AGGLOMERATED
322	BRIQUETTES, LIGNITE AND PEAT
325	COKE, SEMICOKE ETC. OF COAL, LIGNITE ETC., RET CARBON
333	CRUDE OIL FROM PETROLEUM OR BITUMINOUS MINERALS
334	OIL (NOT CRUDE) FROM PETROL & BITUM MINERALS ETC.
335	RESIDUAL PETROLEUM PRODUCTS, NES ETC.
342	LIQUEFIED PROPANE AND BUTANE
343	NATURAL GAS, WHETHER OR NOT LIQEFIED
344	PETROLEUM GASES & OTHER GASEOUS HYDROCARBONS NES
345	COAL GAS, WATER GAS, PRODUCER GAS ETC., NES
411	ANIMAL OILS AND FATS
421	FIXED VEG FATS & OILS, SOFT, CRUDE, REFINED ETC.
422	FIXED VEG FATS & OILS CRUDE, REFINED ETC., NOT SOFT
431	ANIMAL/VEG FATS/OILS PROCESS/WAXES/INEDIBLE PREPS NES
511	HYDROCARBONS NES & SPECIFIED DERIVATIVES
512	ALCOHOLS, PHENOLS ETC. & HALOGENATED ETC. DERIVATIVES
513	CARBOXYLIC ACIDS ETC. HALIDES ETC. & DERIVATIVES
514	NITROGEN-FUNCTION COMPOUNDS
562	FERTILIZERS (EXCEPT CRUDE OF GROUP 272)
579	WASTE, PARINGS AND SCRAP, OF PLASTICS
661	LIME, CEMENT & FABRICATED CONSTRUCT MATERIALS NES
671	PIG IRON, SPIEGELEISEN ETC., IRON & STEEL POWD ETC.

672	IRON OR STEEL PRIMARY FORMS & SEMIFINISH PRODUCTS
673	IRON & NONALLOY STEEL FLAT-ROLL PROD, NOT CLAD ETC.
674	IRON & NONALLOY STEEL FLAT-ROLLED PRODUCTS, CLAD, ETC.
675	ALLOY STEEL FLAT-ROLLED PRODUCTS
677	IRON & STEEL RAILS & RAILWAY TRACK CONST MATERIAL
682	COPPER
683	NICKEL
684	ALUMINUM
685	LEAD
686	ZINC
687	TIN
689	MISC NONFERROUS BASE METALS FOR METALLURGY & CERMETS
722	TRACTORS (OTH THAN MECHANICAL HANDLING EQUIPMENT)
723	CIVIL ENGINEERING & CONTRACTORS' PLANT & EQUIPMENT
781	MOTOR CARS & OTH MOTOR VEHICLES
782	MOTOR VEHICLES FOR TRANSPORT OF GDS & SPEC PUR VEHS
783	ROAD MOTOR VEHICLES, NES
786	TRAILERS & SEMI-TRAILERS, OTH VEH NOT MECHAN PROPLD
791	RAILWAY VEHICLES & ASSOCIATED EQUIPMENT
792	AIRCRAFT & ASSOCIATED EQUIPMENT, SPCECRFT VEH, & PTS
793	SHIPS, BOATS AND FLOATING STRUCTURES
931	SPECIAL TRANSACTIONS & COMMOD NOT CLASSIFIED BY KIND
984	ESTIMATE OF LOW VALUED IMPORT TRANSACTIONS
992	SHIPMENTS NOT OVER $10,000, NOT IDENTIFIED BY KIND
994	EST. LOW VALUE SHIP; CANADIAN LOW VALUE AND NIK

Sources: US Department Of Commerce (1989 and 1993b) and United Nations (1986)

APPENDIX I

1989 IMPORT STATISTICS: US-MEXICO TRADE
(SAS RAW DATA SETS)

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
011	200000	0	0	0	0
012	0	0	0	0	0
017	0	0	0	0	0
022	0	0	0	0	0
025	0	0	0	0	0
034	34000000	10800000	11900000	1800000	800000
035	800000	200000	*1000	100000	*1000
036	320900000	200000	100000	300000	100000
037	30000000	1500000	800000	100000	*1000
046	0	0	0	0	0
047	1200000	0	0	0	0
048	24800000	100000	100000	0	0
054	676000000	100000	100000	300000	300000
056	51500000	1600000	2600000	0	0
057	225500000	1400000	7500000	0	0
058	37100000	100000	100000	0	0
059	63900000	0	0	0	0
062	13400000	0	0	0	0
071	500900000	69000000	42100000	0	0
072	13100000	9600000	2900000	0	0
073	3300000	0	0	0	0
074	100000	0	0	0	0
075	12900000	100000	*1000	0	0
081	900000	0	0	0	0
098	30200000	100000	*1000	0	0
111	23600000	0	0	0	0
112	207100000	4900000	5000000	0	0
121	16500000	3800000	700000	0	0
122	4400000	3300000	200000	200000	*1000
211	6400000	100000	*1000	0	0
231	100000	0	0	0	0
232	29100000	5400000	7000000	0	0
245	2900000	0	0	0	0
246	1600000	0	0	0	0
247	300000	•50000	100000	0	0
248	97200000	600000	400000	0	0
251	8300000	0	0	0	0
263	4100000	0	0	0	0
264	200000	200000	200000	0	0
265	200000	0	0	0	0

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
266	6200000	0	0	0	0
267	2700000	0	0	0	0
268	900000	0	0	0	0
269	2300000	0	0	0	0
515	8600000	0	0	400000	*1000
516	16700000	2900000	2500000	300000	*1000
522	150200000	26700000	399600000	0	0
523	47900000	2900000	8200000	0	0
524	6300000	100000	100000	0	0
531	5500000	0	0	0	0
532	16400000	0	0	0	0
533	11500000	300000	200000	0	0
541	15000000	100000	100000	4500000	*1000
542	1500000	0	0	500000	*1000
551	8000000	900000	100000	200000	*1000
553	3800000	300000	100000	400000	*1000
554	26900000	100000	100000	0	0
571	100000	0	0	0	0
572	13900000	0	0	0	0
573	900000	200000	300000	0	0
574	5000000	100000	*1000	0	0
575	10600000	100000	*1000	0	0
581	12600000	0	0	0	0
582	45900000	0	0	0	0
583	0	0	0	0	0
591	1100000	0	0	0	0
592	3000000	•50000	100000	0	0
593	500000	0	0	0	0
597	2400000	0	0	0	0
598	20800000	0	0	0	0
611	18700000	600000	*1000	400000	*1000
612	16700000	0	0	100000	*1000
613	100000	0	0	0	0
621	15100000	100000	*1000	0	0
625	68700000	0	0	0	0
629	14800000	0	0	100000	*1000
633	0	0	0	0	0
634	19400000	0	0	0	0
635	93000000	300000	200000	100000	*1000
641	124900000	200000	100000	0	0
642	253000000	700000	400000	200000	*1000
651	61500000	100000	*1000	400000	*1000
652	15900000	0	0	400000	*1000
653	0	0	0	0	0
654	0	0	0	0	0
655	1300000	0	0	0	0
656	2200000	100000	*1000	200000	*1000
657	24900000	12100000	14100000	200000	*1000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
658	59100000	0	0	500000	100000
659	12700000	300000	100000	300000	*1000
662	58600000	500000	1500000	0	0
663	31900000	200000	500000	100000	*1000
664	125700000	200000	200000	100000	*1000
665	66700000	100000	100000	100000	*1000
666	16100000	100000	200000	300000	*1000
667	900000	0	0	300000	*1000
676	20500000	7700000	27000000	0	0
678	0	0	0	0	0
679	97800000	23000000	37400000	0	0
681	321100000	0	0	22300000	200000
691	10300000	0	0	0	0
692	28500000	100000	100000	0	0
693	30100000	400000	500000	0	0
694	12400000	100000	200000	300000	100000
695	33100000	200000	*1000	1200000	*1000
696	4300000	0	0	100000	*1000
697	31000000	1100000	500000	100000	*1000
699	302200000	500000	200000	800000	100000
711	9700000	0	0	0	0
712	0	0	0	0	0
713	822400000	200000	100000	300000	*1000
714	64900000	0	0	500000	*1000
716	310900000	100000	*1000	200000	*1000
718	2800000	0	0	0	0
721	12300000	0	0	0	0
724	3000000	300000	100000	0	0
725	300000	0	0	0	0
726	12500000	0	0	0	0
727	1300000	200000	200000	100000	*1000
728	52800000	200000	100000	100000	*1000
731	500000	100000	*1000	0	0
733	1500000	0	0	0	0
735	1500000	0	0	0	0
737	4300000	100000	*1000	0	0
741	199800000	0	0	0	0
742	42700000	0	0	300000	*1000
743	113500000	100000	*1000	400000	*1000
744	127700000	500000	200000	0	0
745	65900000	300000	200000	100000	*1000
746	9500000	0	0	100000	*1000
747	122500000	0	0	100000	*1000
748	36300000	0	0	100000	*1000
749	7600000	0	0	100000	*1000
751	26000000	400000	*1000	300000	*1000
752	464500000	200000	*1000	11500000	100000
759	284500000	200000	*1000	30200000	200000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
761	852700000	300000	*1000	700000	100000
762	720400000	500000	*1000	800000	*1000
763	90900000	200000	*1000	0	0
764	999500000	0	0	2200000	*1000
771	360800000	100000	*1000	1900000	*1000
772	865000000	100000	*1000	3200000	100000
773	1551200000	1500000	600000	4100000	100000
774	17900000	0	0	0	0
775	267100000	400000	100000	0	0
776	436000000	100000	*1000	11400000	100000
778	719900000	1700000	100000	1400000	*1000
784	1071700000	500000	200000	1500000	200000
785	15700000	0	0	0	0
811	1100000	0	0	0	0
812	26800000	200000	200000	0	0
813	83800000	100000	*1000	0	0
821	530100000	1200000	900000	400000	*1000
831	49600000	100000	*1000	500000	*1000
841	217000000	4200000	200000	3700000	100000
842	139800000	700000	*1000	2600000	100000
843	7300000	0	0	200000	*1000
844	49200000	100000	*1000	2700000	100000
845	118000000	200000	*1000	6700000	200000
846	4000000	0	0	100000	*1000
848	55100000	0	0	2000000	100000
851	170000000	100000	*1000	7800000	600000
871	300000	0	0	100000	*1000
872	196900000	100000	*1000	800000	*1000
873	15000000	0	0	0	0
874	258000000	100000	*1000	500000	*1000
881	30600000	0	0	300000	*1000
882	28000000	900000	*1000	5400000	100000
883	200000	0	0	0	0
884	30800000	0	0	300000	*1000
885	5700000	100000	*1000	0	0
891	3000000	0	0	0	0
892	21400000	2400000	900000	1100000	100000
893	125400000	800000	400000	400000	*1000
894	252900000	1600000	200000	1500000	100000
895	48500000	100000	*1000	200000	*1000
896	11000000	0	0	5000000	*1000
897	58100000	200000	*1000	16300000	100000
898	165600000	0	0	2500000	100000
899	43900000	200000	*1000	2600000	200000
950	43100000	0	0	22700000	*1000
961	100000	0	0	0	0
971	97800000	0	0	9000000	*1000

- Assigned a minimum interpolated dollar value of $50,000 to compensate for Bureau of the Census data format limitations.

* Assigned a minimum weight figure of 1,000 kilograms (i.e. 1 metric ton) to compensate for Bureau of the Census data format limitations.

Source: US Department Of Commerce (1989)

1989 EXPORT STATISTICS: US-MEXICO TRADE
(SAS RAW DATA SETS)

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
011	76100000	200000	100000	100000	*1000
012	184500000	0	0	100000	*1000
016	8700000	0	0	0	0
017	10700000	0	0	0	0
022	171800000	0	0	0	0
023	23500000	700000	400000	0	0
024	1400000	0	0	0	0
025	9500000	0	0	100000	*1000
034	4300000	100000	*1000	700000	100000
035	200000	0	0	0	0
036	23300000	500000	100000	100000	*1000
037	3600000	0	0	0	0
046	1200000	0	0	0	0
047	14100000	0	0	0	0
048	36000000	400000	200000	100000	100000
054	84000000	2600000	400000	0	0
056	11800000	800000	400000	100000	100000
057	37000000	400000	200000	•50000	100000
058	6600000	600000	500000	0	0
059	2100000	0	0	0	0
062	12000000	100000	*1000	0	0
071	200000	0	0	0	0
072	1900000	0	0	0	0
073	34500000	100000	*1000	100000	100000
074	400000	100000	200000	0	0
075	2400000	0	0	0	0
081	130000000	600000	2900000	0	0
091	4500000	0	0	0	0
098	31300000	800000	300000	300000	100000
111	4600000	200000	400000	0	0
112	34500000	500000	500000	100000	100000
121	200000	0	0	0	0
122	2200000	0	0	400000	*1000
211	100400000	100000	*1000	200000	100000
212	100000	0	0	0	0
231	7200000	100000	*1000	0	0
232	48600000	•50000	100000	100000	*1000
244	100000	0	0	0	0
245	300000	0	0	0	0
246	7600000	0	0	0	0
247	6600000	100000	200000	0	0
248	128800000	200000	600000	0	0
251	363600000	700000	2100000	0	0
261	100000	0	0	0	0

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
263	30800000	1300000	1100000	0	0
264	600000	0	0	0	0
265	700000	0	0	0	0
266	40300000	0	0	0	0
267	8200000	0	0	0	0
268	2700000	0	0	100000	*1000
269	4500000	100000	200000	200000	100000
515	66300000	300000	100000	4700000	100000
516	90600000	5900000	10300000	400000	*1000
522	107500000	5000000	33500000	200000	100000
523	86400000	200000	600000	100000	*1000
524	10700000	0	0	100000	*1000
525	1700000	0	0	800000	*1000
531	18700000	100000	*1000	900000	100000
532	1500000	0	0	100000	*1000
533	49200000	100000	200000	900000	200000
541	51400000	100000	*1000	19900000	300000
542	23200000	100000	*1000	11500000	200000
551	26600000	300000	*1000	1200000	*1000
553	32100000	5800000	300000	4700000	400000
554	29200000	4400000	12300000	100000	*1000
571	172800000	1000000	1100000	0	0
572	50200000	4400000	2200000	100000	200000
573	33400000	600000	1700000	300000	*1000
574	40300000	100000	100000	300000	*1000
575	243800000	300000	100000	500000	*1000
581	71100000	0	0	500000	100000
582	204800000	300000	*1000	3400000	200000
583	8400000	0	0	600000	*1000
591	31500000	100000	*1000	600000	100000
592	31300000	300000	100000	200000	100000
593	6500000	0	0	200000	*1000
597	35300000	400000	100000	100000	*1000
598	105200000	11000000	26800000	3300000	200000
611	29900000	0	0	800000	*1000
612	3000000	100000	*1000	300000	*1000
613	400000	0	0	300000	*1000
621	34500000	300000	200000	400000	*1000
625	73800000	600000	100000	500000	100000
629	51600000	1100000	800000	1000000	100000
633	1300000	0	0	0	0
634	49800000	200000	500000	0	0
635	31900000	800000	500000	200000	*1000
641	182200000	1100000	700000	600000	300000
642	436000000	2100000	1700000	1900000	600000
651	40900000	500000	300000	1600000	200000
652	16400000	1000000	1000000	1500000	200000
653	130700000	1400000	100000	4000000	300000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
654	20600000	200000	*1000	800000	*1000
655	6500000	0	0	400000	*1000
656	17600000	0	0	1200000	200000
657	80600000	600000	100000	3600000	300000
658	54500000	700000	100000	700000	100000
659	28600000	600000	100000	1400000	100000
662	22100000	800000	1100000	200000	100000
663	50500000	500000	200000	800000	100000
664	55700000	100000	*1000	900000	100000
665	20100000	500000	100000	1000000	100000
666	9900000	500000	100000	400000	*1000
667	2500000	0	0	1300000	*1000
676	59200000	700000	900000	200000	*1000
678	17100000	100000	*1000	200000	*1000
679	66600000	4400000	1200000	600000	100000
681	2100000	0	0	400000	*1000
691	32400000	600000	*1000	400000	*1000
692	29500000	300000	200000	100000	*1000
693	34000000	200000	100000	400000	*1000
694	65000000	0	0	1500000	300000
695	82800000	300000	100000	9300000	200000
696	16400000	100000	*1000	500000	*1000
697	20100000	400000	100000	600000	100000
699	459200000	1200000	300000	5900000	700000
711	7500000	700000	100000	500000	*1000
712	14700000	1000000	*1000	3800000	*1000
713	478300000	5500000	300000	12600000	600000
714	102700000	7900000	*1000	17000000	100000
716	256600000	3800000	500000	2200000	100000
718	11000000	1300000	100000	600000	*1000
721	71300000	2200000	300000	900000	100000
724	99000000	1400000	400000	12700000	500000
725	29700000	100000	*1000	1100000	*1000
726	58000000	2100000	200000	5000000	100000
727	31000000	4100000	700000	1400000	*1000
728	279100000	13200000	1500000	9300000	200000
731	64900000	400000	*1000	1200000	*1000
733	46500000	200000	*1000	600000	*1000
735	60000000	100000	*1000	5600000	100000
737	40200000	1100000	300000	2200000	*1000
741	278100000	5100000	900000	5700000	300000
742	84600000	8800000	200000	10200000	200000
743	232400000	28200000	1300000	13900000	300000
744	182000000	10600000	1500000	5500000	200000
745	125100000	1300000	200000	12100000	300000
746	56900000	3200000	200000	2000000	100000
747	147000000	1900000	100000	5200000	200000
748	98300000	2800000	200000	1500000	100000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
749	77300000	200000	*1000	2800000	100000
751	73100000	400000	*1000	9700000	300000
752	234800000	200000	*1000	70400000	600000
759	459600000	1900000	100000	92200000	800000
761	141100000	2000000	300000	12300000	400000
762	57900000	1400000	200000	2700000	100000
763	161300000	1200000	100000	21400000	300000
764	975800000	4500000	400000	62600000	800000
771	313300000	600000	400000	2600000	100000
772	923400000	1800000	100000	31500000	500000
773	898900000	200000	*1000	4900000	200000
774	35700000	400000	*1000	10500000	100000
775	220900000	3500000	700000	3400000	300000
776	576100000	100000	*1000	80600000	300000
778	622800000	1700000	400000	25600000	400000
784	2005000000	2000000	200000	25600000	2100000
785	28900000	600000	100000	2600000	200000
811	2900000	300000	300000	0	0
812	15000000	300000	100000	100000	*1000
813	38300000	600000	*1000	2900000	100000
821	237700000	3000000	700000	2100000	200000
831	20400000	200000	*1000	700000	*1000
841	93800000	100000	*1000	2400000	200000
842	67600000	0	0	2000000	100000
843	29100000	0	0	800000	*1000
844	25600000	0	0	4700000	500000
845	66200000	1200000	300000	11100000	700000
846	20200000	0	0	800000	*1000
848	79900000	300000	*1000	2400000	100000
851	75400000	900000	200000	3400000	300000
871	6100000	0	0	1600000	*1000
872	163600000	1400000	200000	25400000	400000
873	10200000	800000	*1000	1100000	*1000
874	494700000	6200000	200000	58500000	500000
881	49400000	0	0	8400000	100000
882	46900000	800000	100000	5600000	200000
883	1900000	0	0	1500000	*1000
884	28000000	100000	*1000	6600000	100000
885	33800000	100000	*1000	4900000	100000
891	13200000	0	0	2000000	*1000
892	91200000	500000	100000	14100000	1000000
893	354600000	600000	100000	4800000	400000
894	201000000	3200000	400000	7200000	500000
895	50700000	300000	*1000	5300000	400000
896	9000000	0	0	7200000	*1000
897	15400000	300000	*1000	4100000	200000
898	185700000	1400000	100000	22000000	800000
899	54400000	1300000	200000	8000000	200000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
950	29500000	0	0	28400000	*1000
961	0	0	0	0	0
971	96500000	0	0	76100000	*1000

- Assigned a minimum interpolated dollar value of $50,000 to compensate for Bureau of the Census data format limitations.

* Assigned a minimum weight figure of 1,000 kilograms (i.e. 1 metric ton) to compensate for Bureau of the Census data format limitations.

Source: US Department Of Commerce (1989)

1993 IMPORT STATISTICS: US-MEXICO TRADE
(SAS RAW DATA SETS)

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
011	3134100	1341000	564000	0	0
012	195300	0	0	0	0
017	398800	0	0	26000	1000
022	790700	766000	1065000	0	0
025	182100	0	0	58000	2000
034	28199000	1405000	700000	12492000	4160000
035	800700	0	0	484000	21000
036	234122500	1763000	386000	2072000	169000
037	28243300	263000	109000	630000	60000
046	85900	0	0	0	0
047	169800	0	0	0	0
048	56980100	797000	589000	0	0
054	943221600	460000	503000	536000	486000
056	82607500	138000	199000	123000	34000
057	403073200	69977000	252067000	126000	78000
058	65297600	886000	305000	8000	2000
059	32649800	129000	143000	20000	6000
062	31339500	198000	145000	3000	2000
071	251275100	23777000	17784000	11000	1000
072	15065300	12969000	12090000	0	0
073	10283500	0	0	14000	3000
074	67100	0	0	3000	1000
075	15341300	675000	163000	90000	37000
081	496000	18000	99000	85000	19000
098	35952500	535000	313000	107000	42000
111	25713500	0	0	0	0
112	269597300	14134000	30557000	39000	16000
121	22505500	4600000	835000	6000	1000
122	3687300	3238000	142000	300000	20000
211	4980800	0	0	109000	5000
231	10800	0	0	3000	*1000
232	34007300	0	0	14000	1000
245	2714300	0	0	0	0
246	18706500	0	0	0	0
247	73500	0	0	0	0
248	184937700	530000	502000	14000	3000
251	1957500	0	0	0	0
263	11952800	0	0	1000	*1000
264	0	0	0	0	0
265	648700	10000	32000	59000	13000
266	22745200	0	0	11000	4000
267	1944600	0	0	2000	2000
268	1889900	0	0	21000	*1000
269	1703900	0	0	12000	1000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
515	13410200	5000	2000	981000	14000
516	19099600	1044000	2677000	1012000	7000
522	122409900	35527000	417193000	14000	1000
523	57328800	4484000	16797000	3000	*1000
524	1300600	0	0	306000	12000
531	8487300	25000	1000	65000	3000
532	9443600	132000	16000	4000	*1000
533	9402700	373000	106000	46000	4000
541	22966000	0	0	16482000	81000
542	3706900	0	0	2438000	79000
551	8039000	219000	2000	954000	27000
553	12775500	895000	220000	550000	54000
554	54358600	459000	464000	11000	1000
571	788900	94000	226000	0	0
572	39573000	0	0	0	0
573	4032500	0	0	0	0
574	19923200	2301000	2063000	5000	1000
575	15888400	173000	320000	24000	2000
581	19568200	0	0	49000	15000
582	54657400	908000	597000	427000	32000
583	72900	0	0	2000	*1000
591	3336300	0	0	0	0
592	4819000	0	0	46000	5000
593	5625600	0	0	0	0
597	10203200	0	0	0	0
598	41455600	3000	2000	1078000	35000
611	32798200	170000	17000	2723000	79000
612	29755800	25000	2000	561000	15000
613	105500	0	0	2000	*1000
621	29127200	0	0	163000	23000
625	38327600	271000	88000	542000	218000
629	17116900	67000	9000	597000	36000
633	274300	0	0	0	0
634	12905100	102000	184000	2000	*1000
635	99037300	585000	177000	221000	36000
641	41585700	34000	12000	66000	4000
642	82792600	1267000	504000	655000	72000
651	74625800	83000	34000	1008000	118000
652	25893300	266000	72000	134000	8000
653	11404200	1000	*1000	6625000	477000
654	5372900	682000	443000	561000	14000
655	5359400	0	0	529000	39000
656	9531300	1000	*1000	881000	41000
657	44986700	10558000	8884000	809000	57000
658	237965300	159000	4000	2079000	180000
659	4392600	307000	82000	1287000	125000
662	86542900	206000	433000	0	0
663	65549800	1381000	219000	231000	81000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
664	151955400	860000	1603000	274000	26000
665	106365900	126000	86000	271000	41000
666	30664400	93000	147000	734000	81000
667	2037400	83000	40000	847000	1000
676	15008800	1019000	2890000	0	0
678	1888200	8000	11000	0	0
679	71076600	21840000	44792000	12000	1000
681	123808400	0	0	10609000	54000
691	17907700	126000	97000	12000	2000
692	25531700	2000	*1000	98000	3000
693	22585200	69000	62000	13000	2000
694	13044100	89000	122000	90000	3000
695	42156200	33000	4000	3874000	47000
696	15779000	9000	7000	140000	6000
697	227290800	96000	59000	897000	219000
699	387724500	1200000	370000	5376000	234000
711	10436800	0	0	0	0
712	95000	0	0	0	0
713	1011015900	1078000	102000	569000	22000
714	42431800	0	0	493000	2000
716	558307900	9000	4000	1903000	143000
718	1364900	0	0	44000	1000
721	17702400	4000	*1000	19000	1000
724	8441000	198000	33000	125000	4000
725	887500	0	0	233000	8000
726	10455800	0	0	310000	2000
727	8317300	183000	191000	127000	4000
728	22498000	37000	4000	887000	23000
731	920900	0	0	25000	*1000
733	3779600	3000	*1000	18000	*1000
735	2695600	0	0	243000	4000
737	4129600	0	0	30000	1000
741	320411600	859000	220000	124000	8000
742	61693000	22000	3000	2484000	47000
743	175621600	63000	9000	1283000	39000
744	140860800	46000	10000	222000	13000
745	99931400	0	0	749000	43000
746	13529000	24000	2000	142000	6000
747	320116700	0	0	1064000	38000
748	45055800	39000	6000	453000	14000
749	10050900	77000	31000	476000	18000
751	91245700	322000	24000	124000	7000
752	485370500	803000	45000	40296000	230000
759	513895600	63000	1000	264081000	745000
761	1590987200	1551000	162000	21000	*1000
762	651242700	970000	37000	7808000	114000
763	368265700	1545000	46000	3807000	46000
764	1350826600	204000	7000	53347000	368000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
771	684194500	217000	71000	8644000	121000
772	1349026300	272000	7000	12004000	198000
773	2287173300	114000	2000	20474000	928000
774	75121300	0	0	132000	15000
775	558122200	251000	47000	350000	37000
776	602254500	59000	5000	27464000	301000
778	970496800	1236000	900000	2221000	251000
784	2352221900	950000	147000	8631000	640000
785	33640900	23000	2000	8000	*1000
811	273200	0	0	5000	*1000
812	60348000	22000	16000	72000	67000
813	168932400	20000	8000	134000	14000
821	882168300	1359000	467000	539000	60000
831	67874800	296000	37000	1008000	19000
841	392176600	7555000	268000	9282000	269000
842	275261400	2990000	112000	12295000	392000
843	18105300	128000	6000	87000	6000
844	108123400	7476000	234000	4864000	274000
845	516346400	17308000	433000	10438000	347000
846	5846900	8000	*1000	221000	13000
848	97980600	126000	30000	7233000	243000
851	215693000	1067000	93000	25134000	1451000
871	606200	0	0	515000	8000
872	304764800	5000	*1000	1499000	93000
873	219862300	304000	78000	484000	36000
874	575058800	51000	3000	5108000	51000
881	65143000	24000	1000	4683000	57000
882	52459900	1510000	38000	6886000	144000
883	313900	0	0	299000	3000
884	50044300	1000	*1000	432000	3000
885	36990900	0	0	1574000	11000
891	16575800	0	0	0	0
892	54768100	2596000	2091000	4774000	389000
893	204017500	1156000	544000	2389000	265000
894	356076900	2288000	161000	17369000	535000
895	68466000	40000	4000	369000	44000
896	20053700	0	0	15579000	62000
897	79700400	67000	18000	37274000	125000
898	251304600	327000	69000	10786000	309000
899	78998400	449000	132000	8318000	744000
950	24020900	0	0	23980000	9000
961	213800	0	0	89000	1000
971	12248800	0	0	4748000	1000

* Assigned a minimum weight figure of 1,000 kilograms (i.e. 1 metric ton) to compensate for Bureau of the Census data format limitations.

Source: US Department Of Commerce (1993b)

1993 EXPORT STATISTICS: US-MEXICO TRADE
(SAS RAW DATA SETS)

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
011	113062400	1627000	914000	915000	111000
012	318057800	1613000	1401000	210000	103000
016	17851200	169000	75000	5000	1000
017	77477800	640000	176000	51000	9000
022	185919300	983000	710000	42000	38000
023	21556000	3479000	2239000	0	0
024	20082600	1115000	362000	4000	1000
025	11083500	4000	1000	482000	74000
034	6869100	388000	245000	1552000	317000
035	902000	0	0	203000	26000
036	34627500	284000	94000	166000	17000
037	9402200	289000	48000	267000	52000
046	6458200	23000	44000	0	0
047	13199700	9000	39000	0	0
048	112274200	635000	434000	195000	103000
054	65000500	294000	370000	193000	44000
056	32699900	1392000	1244000	37000	35000
057	132473800	750000	1267000	0	0
058	12366700	645000	511000	10000	6000
059	9968000	76000	67000	58000	27000
062	30241900	87000	35000	34000	17000
071	2288900	74000	11000	254000	32000
072	4788600	304000	344000	0	0
073	45177600	607000	381000	45000	13000
074	1350300	81000	37000	25000	6000
075	7218300	61000	40000	31000	12000
081	215307100	3550000	11199000	61000	22000
091	17461700	566000	452000	0	0
098	123577600	1639000	1099000	916000	328000
111	69763900	880000	2157000	14000	38000
112	58005300	5119000	6678000	103000	43000
121	372900	0	0	93000	10000
122	21657100	262000	14000	183000	10000
211	105635100	119000	86000	420000	12000
212	72400	0	0	58000	2000
231	4820700	187000	140000	78000	2000
232	57030400	28000	17000	18000	36000
244	186100	0	0	0	0
245	485700	50000	38000	0	0
246	658900	14000	58000	0	0
247	19371700	2264000	8806000	0	0
248	248841400	17113000	41089000	28000	45000
251	283157800	205000	1199000	40000	212000
261	364300	0	0	264000	414000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
263	203860600	72000	52000	44000	29000
264	165000	0	0	0	0
265	6100	0	0	0	0
266	32827100	9000	5000	147000	11000
267	3971100	0	0	6000	6000
268	1298800	0	0	14000	6000
269	14827600	4000	9000	233000	25000
515	101710800	812000	380000	16246000	137000
516	160597700	59331000	216686000	1046000	76000
522	113018300	3367000	19212000	417000	56000
523	114420900	1637000	6828000	115000	25000
524	20210000	0	0	401000	7000
525	2781000	0	0	1288000	16000
531	34130600	190000	56000	1489000	70000
532	2587000	144000	159000	50000	1000
533	136817300	2388000	1998000	2325000	172000
541	117440200	1424000	20000	51237000	364000
542	40743300	51000	36000	28030000	243000
551	40944200	298000	66000	3614000	183000
553	121459100	10042000	1448000	8853000	442000
554	81553700	2434000	7271000	146000	29000
571	209342000	3197000	4284000	13000	2000
572	89362700	155000	111000	25000	20000
573	31755900	270000	65000	59000	5000
574	106663400	1441000	5437000	635000	23000
575	307595200	1983000	1119000	668000	73000
581	113884400	843000	1085000	741000	39000
582	407485300	1222000	412000	12651000	479000
583	7069200	3000	7000	213000	27000
591	53669300	3921000	2080000	1335000	210000
592	71775500	0	0	494000	25000
593	10653200	0	0	0	0
597	68394600	6480000	12744000	451000	105000
598	186891300	27973000	30062000	16206000	482000
611	36728700	0	0	668000	53000
612	24438100	10000	1000	195000	7000
613	267300	0	0	160000	1000
621	46648000	34000	5000	648000	39000
625	197681300	619000	143000	972000	109000
629	104158800	572000	73000	1145000	43000
633	956200	276000	138000	131000	6000
634	131043300	9041000	19456000	49000	65000
635	74999900	1631000	1921000	399000	78000
641	400826700	5504000	9920000	946000	448000
642	662489300	8641000	14326000	3411000	868000
651	84389900	988000	279000	6151000	306000
652	37103100	120000	18000	2918000	213000
653	166296400	25231000	1581000	7393000	394000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
654	12440700	36000	3000	1433000	80000
655	18014700	3000	1000	737000	53000
656	64720600	161000	228000	5170000	247000
657	250064500	868000	201000	4600000	227000
658	92428200	929000	171000	1535000	93000
659	69326900	467000	91000	1155000	149000
662	29484400	1486000	2811000	74000	24000
663	58666500	193000	205000	1141000	42000
664	158097600	228000	64000	1343000	73000
665	49997000	465000	231000	2317000	110000
666	11983600	2888000	671000	764000	56000
667	5253200	0	0	2751000	4000
676	153710700	866000	803000	367000	69000
678	31194700	90000	54000	133000	19000
679	105301300	5440000	3706000	812000	72000
681	3741700	0	0	1376000	3000
691	60648200	3219000	950000	514000	33000
692	90240700	706000	285000	188000	13000
693	50713100	908000	741000	1149000	67000
694	155370500	369000	66000	814000	64000
695	122018200	1925000	276000	9929000	118000
696	25315200	165000	13000	1454000	65000
697	43915300	729000	160000	1726000	48000
699	839996300	3707000	1005000	8313000	363000
711	10390900	235000	59000	558000	7000
712	21829400	60000	12000	607000	5000
713	892662200	2115000	314000	16253000	468000
714	109177700	571000	11000	30863000	135000
716	480467400	249000	25000	2308000	99000
718	13138400	429000	13000	901000	26000
721	92784700	5140000	1181000	870000	51000
724	91611500	1643000	162000	9354000	180000
725	41399800	567000	114000	4282000	64000
726	80090200	1350000	75000	14300000	208000
727	40614400	1604000	149000	3140000	52000
728	431763800	5236000	631000	15832000	232000
731	76849700	188000	61000	1822000	62000
733	55754700	81000	17000	775000	14000
735	90543000	221000	34000	35948000	223000
737	64585600	662000	85000	2546000	59000
741	420861900	9330000	1444000	9712000	317000
742	120274900	799000	32000	7271000	161000
743	357996200	7913000	779000	14493000	342000
744	279108600	27762000	10073000	8069000	211000
745	241005800	1601000	292000	17534000	259000
746	59992300	1555000	87000	1729000	41000
747	246477000	1004000	186000	6517000	180000
748	107706800	32000	6000	3297000	108000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
749	140827500	296000	175000	6653000	111000
751	104946200	189000	15000	10161000	288000
752	693504900	1249000	65000	232351000	2027000
759	830732900	756000	108000	204598000	995000
761	139013200	1490000	115000	5367000	132000
762	111272600	2332000	303000	2774000	52000
763	135160200	490000	47000	19335000	175000
764	1592871600	2831000	483000	244266000	1499000
771	554561800	262000	60000	15069000	172000
772	1120332700	862000	139000	35777000	429000
773	1376352900	534000	123000	9138000	305000
774	107554100	3700000	122000	44287000	350000
775	426348000	3096000	564000	1992000	91000
776	1103857000	504000	70000	107556000	274000
778	1342578700	1100000	259000	44383000	722000
784	4268847500	1066000	150000	25020000	2135000
785	32098500	1213000	418000	931000	39000
811	20339600	285000	172000	125000	3000
812	10446200	23000	2000	104000	6000
813	118282600	1568000	268000	4439000	122000
821	711935100	7195000	1815000	2976000	223000
831	22177300	96000	8000	1262000	71000
841	271757100	309000	14000	4436000	179000
842	164431300	308000	42000	5840000	295000
843	24930400	167000	7000	1390000	55000
844	54322100	219000	18000	5011000	175000
845	213973700	502000	129000	12669000	379000
846	69372700	1179000	101000	3981000	172000
848	80509100	364000	43000	11443000	252000
851	108169600	2945000	152000	2578000	139000
871	14341900	0	0	5996000	54000
872	262682700	3078000	462000	55641000	521000
873	105964200	61000	2000	939000	10000
874	999899200	4600000	102000	123147000	905000
881	65381900	42000	1000	13450000	177000
882	100007900	624000	52000	17410000	239000
883	1443400	8000	*1000	1248000	26000
884	61119600	41000	1000	22915000	198000
885	48286200	109000	5000	6849000	88000
891	36411000	0	0	16806000	92000
892	264036400	1959000	827000	27508000	2206000
893	818272200	6829000	1454000	11818000	560000
894	239385800	2527000	735000	8631000	291000
895	82257100	86000	33000	6327000	733000
896	18044800	327000	23000	15624000	66000
897	44641400	17000	*1000	14041000	261000
898	272361800	1228000	110000	75020000	1251000
899	87638500	503000	64000	15113000	279000

SITC Code (comm)	Total Value (U.S.$)	Vessel Value (U.S.$)	Vessel Weight (kilograms)	Air Value (U.S.$)	Air Weight (kilograms)
950	32768700	0	0	32704000	4000
961	279300	0	0	276000	1000
971	116892600	0	0	105785000	10000

* Assigned a minimum weight figure of 1,000 kilograms (i.e. 1 metric ton) to compensate for Bureau of the Census data format limitations.

Source: US Department Of Commerce (1993b)

APPENDIX J

SHIFT-SHARE ANALYSIS PROGRAMS
(FOR SAS SOFTWARE)

IMPORTS IN TEUs:

```
data imp1;
 infile 'a:imp89d3.dat';
 input
 sitc 1 - 3
 totv89 5 - 14
 vslv89 16 - 24
 vslkg89 26 - 35
 airv89 37 - 45
 airkg89 47 - 53;
proc sort;
 by sitc;
data imp2;
 infile 'a:imp93d3.dat';
 input
 sitc 1 - 3
 totv93 5 - 14
 vslv93 16 - 24
 vslkg93 26 - 35
 airv93 37 - 45
 airkg93 47 - 53;
proc sort;
 by sitc;
data merge;
 merge imp1 imp2;
 by sitc;
data exec;
 set merge;
 vslmt89 = 0;
 vslmt93 = 0;
 airmt89 = 0;
 airmt93 = 0;
 vslmt89=(vslkg89/1000);
 vslmt93=(vslkg93/1000);
 airmt89=(airkg89/1000);
 airmt93=(airkg93/1000);
 othv89 = 0;
 othmt89 = 0;
 othv93 = 0;
 othmt93 = 0;
 othv89=totv89-vslv89-airv89;
 othmt89=(othv89*vslmt89)/vslv89;
  if vslv89 & vslmt89=0 then othmt89=(othv89*vslmt93)/vslv93;
  if othv89=0 then othmt89=0;
  if othmt89 le 0 & othv89 gt 0 then othmt89=1;
```

```
  if othv89 gt 0 & vslv89 & vslmt89 & vslv93 & vslmt93=0 then
othmt89=1;
 othmt89=round(othmt89,1);
 othv93=totv93-vslv93-airv93;
 othmt93=(othv93*vslmt93)/vslv93;
  if vslv93 & vslmt93=0 then othmt93=(othv93*vslmt89)/vslv89;
  if othv93=0 then othmt93=0;
  if othmt93 le 0 & othv93 gt 0 then othmt93=1;
  if othv93 gt 0 & vslv89 & vs1mt89 & vslv93 & vslmt93=0 then
othmt93=1;
 othmt93=round(othmt93,1);
  totmt89 = 0;
  totmt89=vslmt89+airmt89+othmt89;
  totmt89=round(totmt89,1);
  totmt93 = 0;
  totmt93=vslmt93+airmt93+othmt93;
  totmt93=round(totmt93,1);
 pcam89=vslmt89+airmt89+othmt89;
 pcam93=vs1mt93+airmt93+othmt93;
title 'tacam89 and tacam93 values: imports (mt)';
proc means sum;
 var pcam89 pcam93;
data mode;
 set exec;
title 'shift-share base data: imports (mt)';
 tacam89 = 8834803;
 tacam93 = 10301818;
 tdshrv = 0;
 tdshra = 0;
 tdshro = 0;
 prosftv = 0;
 prosfta = 0;
 prosfto = 0;
 difsftv = 0;
 difsfta = 0;
 difsfto = 0;
 totsftv = 0;
 totsfta = 0;
 totsfto = 0;
 vs1wt89 = 0;
 airwt89 = 0;
 othwt89 = 0;
 totwt89 = 0;
 vslwt93 = 0;
 airwt93 = 0;
 othwt93 = 0;
 totwt93 = 0;
vslwt89=vslmt89/10;
airwt89=airmt89/10;
othwt89=othmt89/10;
totwt89=totmt89/10;
vslwt93=vslmt93/10;
airwt93=airmt93/10;
```

```
othwt93=othmt93/10;
totwt93=totmt93/10;
  tdshrv=(vslmt89*(tacam93/tacam89)-vslmt89)/10;
  tdshra=(airmt89*(tacam93/tacam89)-airmt89)/10;
  tdshro=(othmt89*(tacam93/tacam89)-othmt89)/10;
  prosftv=(vslmt89*((pcam93/pcam89)-(tacam93/tacam89)))/10;
  prosfta=(airmt89*((pcam93/pcam89)-(tacam93/tacam89)))/10;
  prosfto=(othmt89*((pcam93/pcam89)-(tacam93/tacam89)))/10;
  difsftv=(vslmt93-(vslmt89*(pcam93/pcam89)))/10;
  difsfta=(airmt93-(airmt89*(pcam93/pcam89)))/10;
  difsfto=(othmt93-(othmt89*(pcam93/pcam89)))/10;
if prosftv = '.' then prosftv = 0;
if prosfta = '.' then prosfta = 0;
if prosfto = '.' then prosfto = 0;
if difsftv = '.' then difsftv = 0;
if difsfta = '.' then difsfta = 0;
if difsfto = '.' then difsfto = 0;
if pcam89 = 0 & prosftv = 0 then prosftv = vslmt93/10;
if pcam89 = 0 & prosfta = 0 then prosfta = airmt93/10;
if pcam89 = 0 & prosfto = 0 then prosfto = othmt93/10;
 totsftv=prosftv+difsftv;
 totsfta=prosfta+difsfta;
 totsfto=prosfto+difsfto;
 tdshrv=round(tdshrv,1);
 tdshra=round(tdshra,1);
 tdshro=round(tdshro,1);
 prosftv=round(prosftv,1);
 prosfta=round(prosfta,1);
 prosfto=round(prosfto,1);
 difsftv=round(difsftv,1);
 difsfta=round(difsfta,1);
 difsfto=round(difsfto,1);
 totsftv=round(totsftv,1);
 totsfta=round(totsfta,1);
 totsfto=round(totsfto,1);
 vslwt89=round(vslwt89,1);
 airwt89=round(airwt89,1);
 othwt89=round(othwt89,1);
 totwt89=round(totwt89,1);
 vslwt93=round(vslwt93,1);
 airwt93=round(airwt93,1);
 othwt93=round(othwt93,1);
 totwt93=round(totwt93,1);
title 'data check: imports (TEUs and mt)';
 smprosft = 0;
 smdifsft = 0;
 smtotsft = 0;
smprosft = prosftv + prosfta + prosfto;
smdifsft = difsftv + difsfta + difsfto;
smtotsft = totsftv + totsfta + totsfto;
proc means sum;
 var smprosft smdifsft smtotsft totmt89 totmt93;
data vslteu;
```

```
 set mode;
title 'run By 1993 Vessel Weight: Imports (TEUs)';
proc sort;
 by descending vslwt93;
proc print double;
 var sitc totwt89 totwt93 vslwt89 vslwt93 vslv89 vslv93
     tdshrv prosftv difsftv totsftv tdshra prosfta difsfta
     totsfta tdshro prosfto difsfto totsfto smtotsft;
data twsteu;
 set mode;
title 'run by Total Weight Shift-All Modes: Imports (TEUs)';
proc sort;
 by descending smtotsft;
proc print double;
 var sitc totwt89 totwt93 vslwt89 vslwt93 vslv89 vslv93
     tdshrv prosftv difsftv totsftv tdshra prosfta difsfta
     totsfta tdshro prosfto difsfto totsfto smtotsft;
data vslval;
 set mode;
title 'run by 1993 Vessel Value: Imports (US$ and TEUs)';
proc sort;
 by descending vslv93;
proc print double;
 var sitc totwt89 totwt93 vslwt89 vslwt93 vslv89 vslv93
     tdshrv prosftv difsftv totsftv tdshra prosfta difsfta
     totsfta tdshro prosfto difsfto totsfto smtotsft;
proc means sum;
 var vslwt89 airwt89 othwt89 vslwt93 airwt93 othwt93;
run;
```

Sources: SAS (1988) and author's calculations

EXPORTS IN TEUs:

```
data exp1;
 infile 'a:exp89d3.dat';
 input
 sitc 1 - 3
 totv89 5 - 14
 vslv89 16 - 24
 vslkg89 26 - 35
 airv89 37 - 45
 airkg89 47 - 53;
proc sort;
 by sitc;
data exp2;
 infile 'a:exp93d3.dat';
 input
 sitc 1 - 3
 totv93 5 - 14
 vslv93 16 - 24
 vslkg93 26 - 35
 airv93 37 - 45
 airkg93 47 - 53;
proc sort;
 by sitc;
data merge;
 merge exp1 exp2;
 by sitc;
data exec;
 set merge;
 vslmt89 = 0;
 vslmt93 = 0;
 airmt89 = 0;
 airmt93 = 0;
 vslmt89=(vslkg89/1000);
 vslmt93=(vslkg93/1000);
 airmt89=(airkg89/1000);
 airmt93=(airkg93/1000);
 othv89 = 0;
 othmt89 = 0;
 othv93 = 0;
 othmt93 = 0;
 othv89=totv89-vslv89-airv89;
 othmt89=(othv89*vslmt89)/vslv89;
  if vslv89 & vslmt89=0 then othmt89=(othv89*vslmt93)/vslv93;
  if othv89=0 then othmt89=0;
  if othmt89 le 0 & othv89 gt 0 then othmt89=1;
  if othv89 gt 0 & vslv89 & vslmt89 & vslv93 & vslmt93=0 then
othmt89=1;
 othmt89=round(othmt89,1);
 othv93=totv93-vslv93-airv93;
 othmt93=(othv93*vslmt93)/vslv93;
  if vslv93 & vslmt93=0 then othmt93=(othv93*vslmt89)/vslv89;
  if othv93=0 then othmt93=0;
```

```
  if othmt93 le 0 & othv93 gt 0 then othmt93=1;
  if othv93 gt 0 & vslv89 & vslmt89 & vslv93 & vslmt93=0 then
othmt93=1;
 othmt93=round(othmt93,1);
  totmt89 = 0;
  totmt89=vslmt89+airmt89+othmt89;
  totmt89=round(totmt89,1);
  totmt93 = 0;
  totmt93=vslmt93+airmt93+othmt93;
  totmt93=round(totmt93,1);
 pcam89=vslmt89+airmt89+othmt89;
 pcam93=vslmt93+airmt93+othmt93;
title 'tacam89 and tacam93 values: exports (mt)';
proc means sum;
 var pcam89 pcam93;
data mode;
 set exec;
title 'shift-share base data: exports (mt)';
 tacam89 = 6881156;
 tacam93 = 15399444;
 tdshrv = 0;
 tdshra = 0;
 tdshro = 0;
 prosftv = 0;
 prosfta = 0;
 prosfto = 0;
 difsftv = 0;
 difsfta = 0;
 difsfto = 0;
 totsftv = 0;
 totsfta = 0;
 totsfto = 0;
 vslwt89 = 0;
 airwt89 = 0;
 othwt89 = 0;
 totwt89 = 0;
 vslwt93 = 0;
 airwt93 = 0;
 othwt93 = 0;
 totwt93 = 0;
vslwt89=vslmt89/10;
airwt89=airmt89/10;
othwt89=othmt89/10;
totwt89=totmt89/10;
vslwt93=vslmt93/10;
airwt93=airmt93/10;
othwt93=othmt93/10;
totwt93=totmt93/10;
  tdshrv=(vslmt89*(tacam93/tacam89)-vslmt89)/10;
  tdshra=(airmt89*(tacam93/tacam89)-airmt89)/10;
  tdshro=(othmt89*(tacam93/tacam89)-othmt89)/10;
  prosftv=(vslmt89*((pcam93/pcam89)-(tacam93/tacam89)))/10;
  prosfta=(airmt89*((pcam93/pcam89)-(tacam93/tacam89)))/10;
```

```
  prosfto=(othmt89*((pcam93/pcam89)-(tacam93/tacam89)))/10;
  difsftv=(vslmt93-(vslmt89*(pcam93/pcam89)))/10;
  difsfta=(airmt93-(airmt89*(pcam93/pcam89)))/10;
  difsfto=(othmt93-(othmt89*(pcam93/pcam89)))/10;
if prosftv = '.' then prosftv = 0;
if prosfta = '.' then prosfta = 0;
if prosfto = '.' then prosfto = 0;
if difsftv = '.' then difsftv = 0;
if difsfta = '.' then difsfta = 0;
if difsfto = '.' then difsfto = 0;
if pcam89 = 0 & prosftv = 0 then prosftv = vslmt93/10;
if pcam89 = 0 & prosfta = 0 then prosfta = airmt93/10;
if pcam89 = 0 & prosfto = 0 then prosfto = othmt93/10;
 totsftv=prosftv+difsftv;
 totsfta=prosfta+difsfta;
 totsfto=prosfto+difsfto;
 tdshrv=round(tdshrv,1);
 tdshra=round(tdshra,1);
 tdshro=round(tdshro,1);
 prosftv=round(prosftv,1);
 prosfta=round(prosfta,1);
 prosfto=round(prosfto,1);
 difsftv=round(difsftv,1);
 difsfta=round(difsfta,1);
 difsfto=round(difsfto,1);
 totsftv=round(totsftv,1);
 totsfta=round(totsfta,1);
 totsfto=round(totsfto,1);
 vslwt89=round(vslwt89,1);
 airwt89=round(airwt89,1);
 othwt89=round(othwt89,1);
 totwt89=round(totwt89,1);
 vslwt93=round(vslwt93,1);
 airwt93=round(airwt93,1);
 othwt93=round(othwt93,1);
 totwt93=round(totwt93,1);
title 'data check: exports (TEUs and mt)';
 smprosft = 0;
 smdifsft = 0;
 smtotsft = 0;
smprosft = prosftv + prosfta + prosfto;
smdifsft = difsftv + difsfta + difsfto;
smtotsft = totsftv + totsfta + totsfto;
proc means sum;
 var smprosft smdifsft smtotsft totmt89 totmt93;
data vslteu;
 set mode;
title 'run by 1993 Vessel Weight: Exports (TEUs)';
proc sort;
 by descending vslwt93;
proc print double;
 var sitc totwt89 totwt93 vslwt89 vslwt93 vslv89 vslv93
     tdshrv prosftv difsftv totsftv tdshra prosfta difsfta
```

```
     totsfta tdshro prosfto difsfto totsfto smtotsft;
data twsteu;
 set mode;
title 'run by Total Weight Shift-All Modes: Exports (TEUs)';
proc sort;
 by descending smtotsft;
proc print double;
 var sitc totwt89 totwt93 vslwt89 vslwt93 vslv89 vslv93
     tdshrv prosftv difsftv totsftv tdshra prosfta difsfta
     totsfta tdshro prosfto difsfto totsfto smtotsft;
data vslval;
 set mode;
title 'run by 1993 Vessel Value: Exports (US$ and TEUs)';
proc sort;
 by descending vslv93;
proc print double;
 var sitc totwt89 totwt93 vslwt89 vslwt93 vslv89 vslv93
     tdshrv prosftv difsftv totsftv tdshra prosfta difsfta
     totsfta tdshro prosfto difsfto totsfto smtotsft;
proc means sum;
 var vslwt89 airwt89 othwt89 vslwt93 airwt93 othwt93;
run;
```

Sources: SAS (1988) and author's calculations

APPENDIX K

TOP-TWENTY US IMPORT COMMODITY LISTS

(BY 1993 VESSEL WEIGHT, 1993 VESSEL VALUE, AND TOTAL WEIGHT SHIFT-ALL MODES)

1993 VESSEL WEIGHT

(TEUs)

SITC	Commodity List
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
112	ALCOHOLIC BEVERAGES
071	COFFEE AND COFFEE SUBSTITUTES
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
072	COCOA
657	SPECIAL YARNS, SPECIAL TEXTILE FABRICS, ETC.
676	IRON & STEEL BARS, RODS, ANGLES, SHAPES & SECTIONS
516	ORGANIC CHEMICALS, NES
892	PRINTED MATTER
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
664	GLASS
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
778	ELECTRICAL MACHINERY AND APPARATUS, NES
121	TOBACCO, UNMANUFACTURED, TOBACCO REFUSE
034	FISH, FRESH (LIVE OR DEAD), CHILLED OR FROZEN
582	PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
048	CEREAL PREPS & PREPS OF FLOUR OR STARCH OF FRTS OR VEGS
011	MEAT OF BOVINE ANIMALS, FRESH, CHILLED OR FROZEN

TOTAL WEIGHT SHIFT-ALL MODES

(TEUs)

SITC	Commodity List
778	ELECTRICAL MACHINERY AND APPARATUS, NES
112	ALCOHOLIC BEVERAGES
716	ROTATING ELECTRIC PLANT AND PARTS THEREOF, NES
054	VEGS FRSH, CHLD, FROZ, ROOTS, TUBERS ETC. FRESH, DRIED
771	ELECTRIC POWER MACHINERY, AND PARTS THEREOF
761	TELEVISION RECEIVERS
664	GLASS
697	HOUSEHOLD EQUIPMENT OF BASE METAL, NES
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
741	HEATING & COOLING EQUIPMENT AND PTS THEREOF
813	LIGHTING FIXTURES AND FITTINGS NES
872	INST & APPLIANCES, NES, FOR MED, SURG, DENT, OR VET PURP
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
873	METERS AND COUNTERS, NES
898	MUSICAL INSTRUMENTS AND PARTS, RECORDS, TAPES ETC.
884	OPTICAL GOODS, NES
764	TELECOMMUNICATIONS EQUIPMENT, NES & PTS, NES
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
059	FRUIT/VEG JUICES UNFERMENTED NOT INCL ADDED SPIRIT

1993 VESSEL VALUE

(US$)

SITC	Commodity List
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
071	COFFEE AND COFFEE SUBSTITUTES
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
845	ARTICLES OF APPAREL, OF TEXTILE FABRICS, NES
112	ALCOHOLIC BEVERAGES
072	COCOA
657	SPECIAL YARNS, SPECIAL TEXTILE FABRICS, ETC.
841	MEN'S OR BOYS' COATS, JACKETS ETC., TEXT, NOT KNIT
844	WOMEN'S OR GIRLS' COATS, CAPES ETC., TEXTILE, KNIT
121	TOBACCO, UNMANUFACTURED, TOBACCO REFUSE
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
122	TOBACCO, MFG WHETHER CONTAINING TOBACCO SUBSTITUTE
842	WOMEN'S & GIRLS' COATS, CAPES ETC., TEX FABRIC, NOT KNIT
892	PRINTED MATTER
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
894	BABY CARRIAGES, TOYS, GAMES AND SPORTING GOODS
036	CRUSTACEAN ETC. FRSH, CHLD, FROZ, DRIED, SALTED, ETC.
761	TELEVISION RECEIVERS
763	SOUND RECORDERS, TV RECORDERS, PREPARED UNRECORDED MEDIA

Sources: United Nations (1986) and author's calculations

APPENDIX L

TOP-TWENTY US EXPORT COMMODITY LISTS

(BY 1993 VESSEL WEIGHT, 1993 VESSEL VALUE, AND TOTAL WEIGHT SHIFT-ALL MODES)

1993 VESSEL WEIGHT

(TEUs)

SITC	Commodity List
516	ORGANIC CHEMICALS, NES
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
598	MISCELLANEOUS CHEMICAL PRODUCTS, NES
634	VENEERS, PLYWOOD, PARTICLE BRD, OTHER WORKED WOOD NES
522	INORGANIC CHEMICAL ELEMENTS, OXIDES, HALOGEN SALTS
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
081	FEEDING STUFF FOR ANIMALS NOT INCL UNMILLED CEREAL
744	MECHANICAL HANDLING EQUIPMENT, & PTS THEREOF, NES
641	PAPER AND PAPERBOARD
247	WOOD IN THE ROUGH OR ROUGHLY SQUARED
554	SOAP, CLEANSING AND POLISHING PREPARATIONS
523	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS
112	ALCOHOLIC BEVERAGES
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
571	POLYMERS OF ETHYLENE, IN PRIMARY FORMS
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
662	CLAY AND REFRACTORY CONSTRUCTION MATERIALS
023	BUTTER AND OTHER FATS AND OILS DERIVED FROM MILK
111	NON-ALCOHOLIC BEVERAGES, NES

TOTAL WEIGHT SHIFT-ALL MODES

(TEUs)

SITC	Commodity List
641	PAPER AND PAPERBOARD
574	POLYACETALS ETC., EPOXIDE RESINS ETC., PRIMARY FORMS
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
773	EQUIPMENT FOR DISTRIBUTING ELECTRICITY, NES
012	MEAT NES & EDIBLE OFFAL, FRSH, CHLD, FROZ
516	ORGANIC CHEMICALS, NES
057	FRUIT, NUTS (NOT INCLUDING OIL NUTS) FRESH OR DRIED
784	PARTS AND ACCESSORIES OF MOTOR VEHICLES, ETC.
111	NON-ALCOHOLIC BEVERAGES, NES
581	TUBES, PIPES AND HOSES OF PLASTICS
022	MILK, CREAM, MILK PRODUCTS EXCEPT BUTTER OR CHEESE
582	PLATES, SHEETS, FILM, FOIL & STRIP, OF PLASTICS
776	THERMIONIC, COLD CATHODE, PHOTO-CATHODE VALVES ETC.
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
263	COTTON TEXTILE FIBERS
656	TULLES, LACE, EMBROIDERY, RIBBONS, TRIMMINGS, ETC.
749	NONELECTRIC PARTS & ACCESSORIES OF MACHINERY NES
211	HIDES & SKINS (EXCEPT FURSKINS), RAW
713	INTERNAL COMBUSTION PISTON ENGS, AND PTS, NES
892	PRINTED MATTER

1993 VESSEL VALUE

(US$)

SITC	Commodity List
516	ORGANIC CHEMICALS, NES
598	MISCELLANEOUS CHEMICAL PRODUCTS, NES
744	MECHANICAL HANDLING EQUIPMENT, & PTS THEREOF, NES
653	WOVEN FABRICS, MAN-MADE TEXT MAT (NOT NARROW OR SPEC FAB)
248	WOOD, SIMPLY WORKED AND RAILWAY SLEEPERS OF WOOD
553	PERFUMERY, COSMETICS OR TOILET PREPS, EXCEPT SOAPS
741	HEATING & COOLING EQUIPMENT AND PTS THEREOF
634	VENEERS, PLYWOOD, PARTICLE BRD, OTHER WORKED WOOD NES
642	PAPER & PAPERBOARD, CUT TO SIZE OR SHAPE, ARTICLES
743	PUMPS, AIR OR OTHER GAS COMPRESSORS AND FANS
821	FURNITURE & PTS, BEDDING, MATTRESSES, ETC.
893	ARTICLES, NES OF PLASTICS
597	ADDITIVES FOR MINERAL OILS ETC., ANTI-FREEZE ETC. PREPS
641	PAPER AND PAPERBOARD
679	IRON & STEEL TUBES, PIPES & HOLLOW PROFILES, FITTINGS
728	MACHRY ETC. SPECIALIZED FOR PARTICULAR INDUSTRIES NES
721	AGRICULTURAL MACHINERY (EXCL TRACTORS) & PARTS
112	ALCOHOLIC BEVERAGES
874	MEASURING/CHECKING/ANALYZING & CONTROL INST & APPARAT NES
591	INSECTICIDES, DISINFECTANTS ETC., RETAIL PACKED ETC.

Sources: United Nations (1986) and author's calculations

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